Dell PowerEdge C6105 Systems
Hardware Owner's Manual

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better user of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

About Your System

Accessing System Features During Startup

The following keystrokes provide access to system features during startup.

Keystroke	Description
<F2>	Enters the System Setup program. See "Start Menu" on page 30.
<F11>	Enters the BIOS Boot Manager. See "System Setup Options at Boot" on page 31.
<F12>	Starts Preboot eXecution Environment (PXE) boot.
<Ctrl><C>	Enters the SAS 2008 Daughter Card Configuration Utility. For more information, see the SAS adapter documentation.
<Ctrl><H>	Enters the LSI 9260 configuration utility. For more information, see the documentation for your SAS RAID card.
<Ctrl><S>	Enters the utility to configure NIC settings for PXE boot. For more information, see the documentation for your integrated NIC.
<Ctrl><HOME>	BIOS recovery during Boot Block.

Front-Panel Features and Indicators

Figure 1-1.   Front Panel–3.5" Hard Drives With Four System Boards
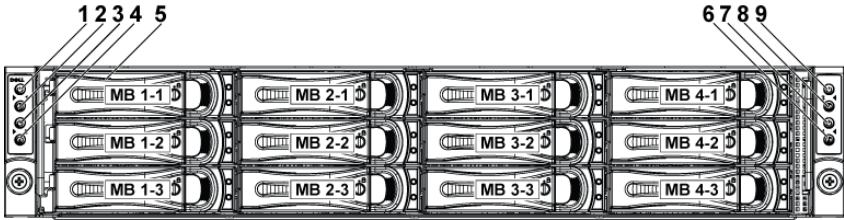
Figure 1-2.   Front Panel –3.5" Hard Drives With Two System Boards
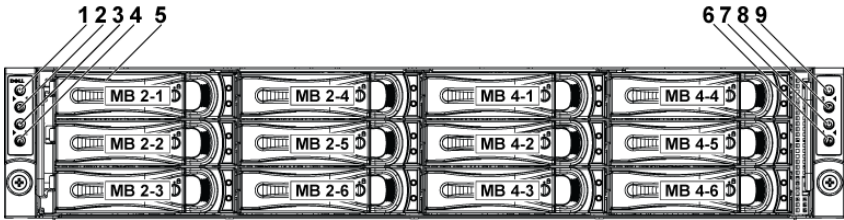
Figure 1-3.   Front Panel– 2.5" Hard Drives With Four System Boards
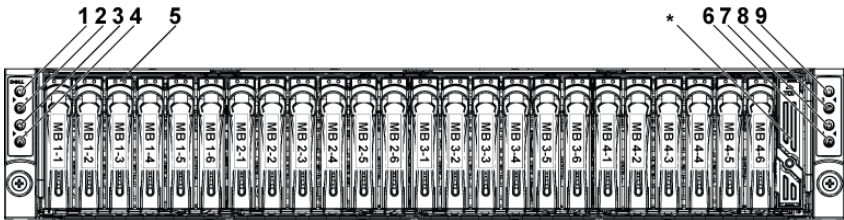
Figure 1-4.   Front Panel—2.5" Hard Drives With Two System Boards

Item	Indicator, Button Or Connector	Icon	Description
1,3,7,9	Power-on indicator/ power button (system boards 1,2,4,3)	⏻	The power-on indicator lights when the system power is on. The power button controls the DC power supply output to the system.
			NOTE: When powering on the system, the video monitor can take from several seconds to over 2 minutes to display an image, depending on the amount of memory installed in the system.
			NOTE: On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.
			NOTE: To force an ungraceful shutdown, press and hold the power button for 5 seconds.

Item	Indicator, Button Or Connector	Icon	Description
2,4,6,8	System identification indicator/button (system boards 1,2,4,3)	ℹ	The identification button can be used to locate a particular system and system board within a chassis. When the button is pushed, the blue system status indicator on the front and back blink until the button is pushed again.
5	Hard Drives		Up to twelve hot-swappable 3.5-inch hard drives. Up to twenty four hot-swappable 2.5-inch hard drives.
*	Drive Cover		Applicable only for 2.5" hard drive system.

Hard-Drive Indicator Patterns

Figure 1-5. Hard Drive Indicators
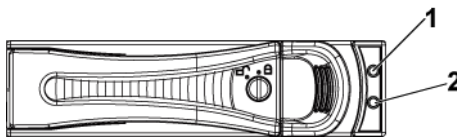
1	hard-drive activity indicator (green)	2	hard-drive status indicator (green and amber)

Table 1-1. Hard Drive Status Indicators

For 2.5"/3.5" Hard-Drive Backplane (CPLD)

Controller	HDD Type	Function	Activity LED	Status LED	
			Green	Green	Amber
SP5100	SATA2	Drive on-line	Off/ Blinking when active	On	Off
		Fail	Off	On	Off
LSI 9260 / LSI 2008	SAS / SATA2	Slot Empty	Off	Off	Off
		Drive On-line/Access	Blinking when active	On	Off
		Drive Fail	Off	Off	Blinking 2Hz
		Drive Rebuild	Blinking when active	Blinking 1Hz	Off
		Drive Identify	Blinking when active	Blinking 2Hz	Off

For 2.5" Hard-Drive Backplane with Expander

Controller	HDD Type	Function	Activity LED	Status LED	
			Green	Green	Amber
LSI 9260	SAS / SATA2	Slot Empty	Off	Off	Off
		Drive On-Line	Off/ Blinking when active	On	Off
		Drive Identify/ Preparing for removal	Off/ Blinking when active	On 250ms Blinking 2Hz Off 250ms	Off
		Drive Rebuild	Off/ Blinking when active	On 400ms Blinking 2Hz Off 100ms	Off
		Drive Fail	Off	Off	On 125ms Blinking 4Hz Off 125ms
		Predicted Failure (SMART)	Off/ Blinking when active	On 500ms Off 500ms Blinking 0.5Hz Off 1000ms	On 500ms Off 500ms Blinking 0.5Hz Off 1000ms

For 2.5" Hard-Drive Backplane with Expander

Controller	HDD Type	Function	Activity LED	Status LED	
			Green	Green	Amber
LSI 9260	SAS / SATA2	Rebuild Abort	Off	On 3000ms Off 3000ms Blinking 0.08Hz Off 3000ms Off 3000ms	On 3000ms Off 3000ms Blinking 0.08Hz Off 3000ms Off 3000ms
LSI 2008	SAS / SATA2	Slot Empty	Off	Off	Off
		Drive On-Line	Off/ Blinkin g when active	On	Off
		Drive Identify/ Preparing for removal	Off/ Blinkin g when active	On 250ms Blinking 2Hz Off 250ms	Off
		Drive Rebuild	Off/ Blinkin g when active	On 400ms Blinking 2Hz Off 100ms	Off
		Drive Fail	Off	Off	On 125ms Blinking 4Hz Off 125ms

Back Panel Features and Indicators

Figure 1-6.   Back Panel—Four System Boards

Item	Indicator, Button Or Connector	Icon	Description
1	Power supply 2		470W/750W/1100W/1400W
2	Power supply 1		470W/750W/1100W/1400W
3	USB ports (2)		Connect USB devices to the system. The ports are USB 2.0-compliant
4	System identification indicator		Both the systems management software and the identification buttons located on the front can cause the indicator to flash blue to identify a particular system and system board. Lights amber when the system needs attention due to a problem.
5	NIC connector 1		Embedded 10/100/1000 NIC connectors.

6	NIC connector 2		Embedded 10/100/1000 NIC connectors.
7	Management port		Dedicated management port.
8	Serial port		Connects a serial device to the system.
9	VGA port		Connects a VGA display to the system.
10	Power-on indicator/power button		The power-on indicator lights when the system power is on. The power button controls the DC power supply output to the system.
			NOTE: When powering on the system, the video monitor can take from several seconds to over 2 minutes to display an image, depending on the amount of memory installed in the system.
			NOTE: On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.
			NOTE: To force an ungraceful shutdown, press and hold the power button for five seconds.

Figure 1-7. Enumeration—Four System Boards
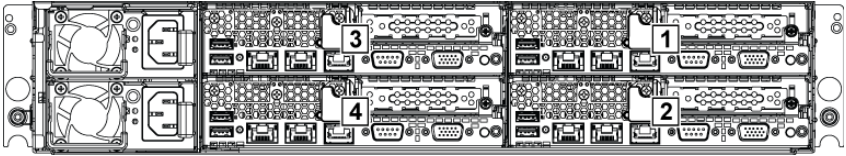
Figure 1-8. Enumeration—Two System Boards
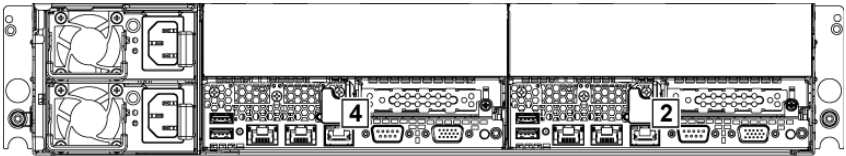
NIC Indicator Codes

Figure 1-9. NIC Indicators
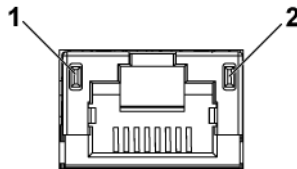
| 1 | link/activity indicator | 2 | speed indicator |

NIC Status Indicator (link/activity)	Condition
Solid green	LAN linking/No access
Blinks green	LAN accessing
Off	No link

NIC Status Indicator (speed)	Condition
Solid green	Linking at 100Mbps speed
Solid amber	Linking at 1000Mbps speed
Off	No link

Figure 1-10. NIC Indicators (Management Port)
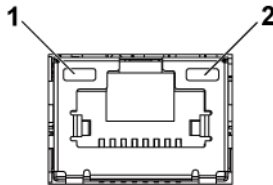
1	link/activity indicator	2	speed indicator

NIC Status Indicator (link/activity)	Condition
Solid green	LAN linking/Accessing
Off	No link

NIC Status Indicator (speed)	Condition
Solid green	Linking at 10Mbps speed
Solid amber	Linking at 100Mbps speed
Off	No link

Power and System Board Indicator Codes

The LEDs on the system front panel and back panel display status codes during system startup. For location of the LEDs on the front panel, see Figure 1-1 for 3.5" hard drive and Figure 1-3 for 2.5" hard drive systems. For location of the LEDs on the back panel, see Figure 1-6.
Table 1-2 lists the status associated with the status codes.

Table 1-2. Status Indicator Codes

Component	Indicator	Condition
Power-on indicator	Steady Green	Power On S0/S1
	Blinks Amber	BMC Critical condition event in Power Off mode S5
	Blinks Green/Amber	BMC Critical condition event in Power On mode S0/S1
System identification indicator	Steady Blue	IPMI Via OEM Command On
	Blinks Blue	IPMI using Chassis Identify Command Blink On or ID Button Press ID On
	Off	IPMI using Chassis Identify Command Off or ID Button Press ID Off

Power Supply Indicator Codes

Figure 1-11. Power Supply Status Indicator
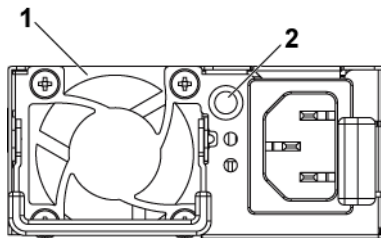
1	power supply	2	AC power LED

AC Power LED	Condition
Solid green	Power supply is on (AC OK/DC OK) or in standby mode (90 VAC-264 VAC for 470W/750W/1100W, 180 VAC-264 VAC for 1400W)
Solid yellow	Power supply is at fault condition (UVP/OVP/OCP/SCP/OTP/Fan Fault)
Off	Power supply is off or AC input voltage is out of normal operating range (90 VAC-264 VAC for 470W/750W/1100W, 180 VAC-264 VAC for 1400W)

BMC Heart Beat LED

The system board provides BMC heart beat LED (D5) for BMC debugs. When BMC firmware is ready, the BMC heart beat LED blinks.

Figure 1-12.   BMC Heart Beat LED

1	BMC heart beat LED	2	system board
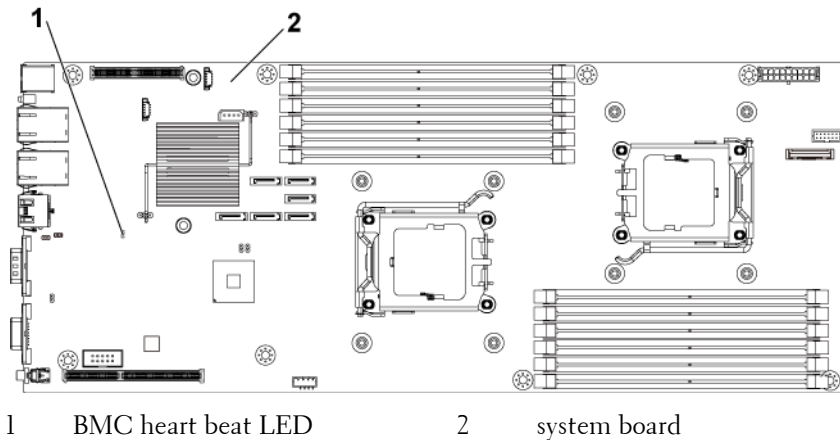
Post Error Code

Collecting System Event Log (SEL) for Investigation

Whenever possible, the BIOS will output the current boot progress codes on the video screen. Progress codes are 32-bit quantities plus optional data. The 32-bit numbers include class, subclass, and operation information. The class and subclass fields point to the type of hardware that is being initialized. The operation field represents the specific initialization activity. Based on the data bit availability to display progress codes, a progress code can be customized to fit the data width. The higher the data bit, the higher the granularity of information that can be sent on the progress port. The progress codes may be reported by the system BIOS or option ROMs. The Response section in the following table is divided into 3 types:

1 **Warning** or **Not an error** – The message is displayed on the screen. An error record is logged to the SEL. The system will continue booting with a degraded state. The user may want to replace the erroneous unit.

2 **Pause** – The message is displayed on the screen, an error is logged to the SEL, and user input is required to continue. The user can take immediate corrective action or choose to continue booting.

3 **Halt** – The message is displayed on the screen, an error is logged to the SEL, and the system cannot boot unless the error is resolved. The user needs to replace the faulty part and restart the system.

Error Code	Error Message	Response
0000	Timer Error	Pause
0003	CMOS Battery Low	Pause
0004	CMOS Settings Wrong	Pause
0005	CMOS Checksum Bad	Pause
000B	CMOS Memory Size Wrong	Pause
000C	RAM Read/Write Test Failed	Pause

Error Code	Error Message	Response
000E	A: Driver Error	Pause
000F	B: Driver Error	Pause
0012	CMOS Date/Time Not Set	Pause
0040	Refresh Timer Test Failed	Halt
0041	Display Memory Test Failed	Pause
0042	CMOS Display Type Wrong	Pause
0044	DMA Controller Error	Halt
0045	DMA-1 Error	Halt
0046	DMA-2 Error	Halt
0047	Unknown BIOS error. Error code = 0047	Halt
0048	Password Check Failed	Halt
0049	Unknown BIOS error. Error code = 0049	Halt
004A	Unknown BIOS error. Error code = 004A	Pause
004B	Unknown BIOS error. Error code = 004B	Pause
005D	S.M.A.R.T. Command Failed S.M.A.R.T. Status BAD, Backup and Replace	Pause
005E	Password Check Failed	Pause
0060	Primary Master Hard Disk Error	Pause
0061	Primary Salve Hard Disk Error	Pause
0062	Secondary Master Hard Disk Error	Pause
0063	Secondary Salve Hard Disk Error	Pause
0080	Primary Master Drive – ATAPI Incompatible	Pause

Error Code	Error Message	Response
0081	Primary Salve Drive – ATAPI Incompatible	Pause
0082	Secondary Master Drive – ATAPI Incompatible	Pause
0083	Secondary Salve Drive – ATAPI Incompatible	Pause
0160	The processors installed in your system are not able to match their frequencies.	Pause
0162	The processors installed in your system do not have the same cache size.	Halt
0163	The processor(s) installed in your system are not known by the BIOS. Please contact your BIOS vendor for appropriate updates.	Pause
0164	Multiple core processors cannot be installed with single core processors.	Halt
0165	The processor(s) installed in your system are of an unknown revision. Please contact your BIOS vendor for appropriate updates.	Pause
4100	Node(s) - no valid DIMM configuration detected	Pause
4101	DIMM(s) checksum error detected	Pause
4102	DIMM module type(buffer) mismatch	Pause
4103	DIMM CL/T mismatch	Pause
4104	DIMM organization mismatch (128-bit)	Pause
4105	SPD missing Trc or Trfc info	Pause
4106	SPD missing byte 23 or 25	Pause
4107	Bank interleave requested but not enabled	Warning

Error Code	Error Message	Response
4108	Dram ECC requested but not enabled	Pause
4109	Online spare requested but not enabled	Pause
410A	DIMM(s) Running in Minimum Mode	Pause
410B	No DQS Receiver Enable pass window found	Pause
410C	DQS Rcvr En pass window CHA to CH B too large	Pause
410D	DQS Rcvr En pass window too small (far right of dynamic range)	Pause
4160	The processor(s) installed in your system are not multiprocessing capable.	halt
5120	CMOS cleared by jumper	Pause
5121	Password cleared by jumper	Pause
8101	Warning! USB Host Controller not found at the specified address!!!	Warning
8102	Error! USB device failed to initialize!!!	Warning
8103	Warning! Unsupported UBS device found and disabled!!!	Warning
8104	Warning! Port 60h/64h emulation is not supported by this USB Host Controller!!!	Warning
8105	Warning! EHCI controller disabled. It requires 64bit data support in the BIOS.	Pause
8400	Warning!! Insufficient memory! Remote access is disabled.	Warning
8601	Error: BMC Not Responding	Pause
8701	Insufficient Runtime space for MPS data!! System may operate in PIC or Non-MPS mode.	Pause

Error Code	Error Message	Response
8702	No enough APIC ID in range 0-0Fh can be assigned to IO APICs. (Re-assigning CPUs' local APIC ID may solve this issue) MPS Table is not built! System may operate in PIC or Non-MPS mode.	Pause

Other Information You May Need

⚠ **WARNING: See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.**

The *Getting Started Guide* provides an overview of rack installation, system features, setting up your system, and technical specifications.

✎ **NOTE:** Always check for updates on **support.dell.com/manuals** and read the updates first because they often supersede information in other documents.

2

Using the System Setup Program

Start Menu

The system employs the latest AMI CMOS BIOS, which is stored in Flash memory. The Flash memory supports the Plug and Play specification, and contains a System Setup program, the Power On Self Test (POST) routine, and the PCI auto-configuration utility.

This system board supports system BIOS shadowing, enabling the BIOS to execute from 64-bit onboard write-protected DRAM.

This Setup utility should be executed under the following conditions:

- When changing the system configuration, configure items such as:
  – Hard drives, diskette drives, and peripherals
  – Password protection from unauthorized use
  – Power management features
- When a configuration error is detected by the system and you are prompted to make changes to the Setup utility
- When redefining the communication ports to prevent any conflicts.
- When changing the password or making other changes to the security setup.

NOTE: Only items in brackets [ ] can be modified. Items that are not in brackets are display only.

System Setup Options at Boot

<F2>	Initiate Setup during POST
<F9>	Load optimal (e.g. CMOS) defaults
<F10>	Save Settings and exit in BIOS Setup

Console Redirection

The console redirection allows a remote user to diagnose and fix problems on a server, which has not successfully booted the OS. The centerpiece of the console redirection is the BIOS Console. The BIOS Console is a Flash ROM-resident utility that redirects input and output over a serial or modem connection.
 The BIOS supports console redirection to a serial port. If serial port based headless server support is provided by the system, the system must provide support for redirection of all BIOS driven console I/O to the serial port. The driver for the serial console must be capable of supporting the functionality documented in the ANSI Terminal Definition.

Main Menu

The main menu displays information about your system boards and BIOS.

Main Screen

```
                          BIOS SETUP UTILITY
    Main     Advanced    Boot     Server    Security   Exit
  System Overview                                   Use [ENTER], [TAB]
  BIOS Firmware                                     or [SHIFT-TAB] to
  Version      :0.1.9                               select a field.
  Build Data   :06/24/10
                                                    Use [+] or [-] to
                                                    configure system Time.
  System Firmware
  BMC FW       :01 01.04
  PIC FW       :N/A

  Product Information
  Name         :PowerEdge C6105
  Asset Tag    :31S26MB0020
  Service Tag  :G6MVW2X
  ePPID        :CN0TJXMG7170303M0011A00

  Processor
  AMD Opteron(tm) Processor 4176HE
  Speed        :2100MHz
  Count        :2

  Systme Memory
  Size         :16384MB                          ←→  Select Screen
                                                 ↑↓  Select Item
  System Date             [Wed 08/03/2010]       +-  Change Option
  System Time             [13:49:03]             Tab Select Field
                                                 F1  General Help
                                                 F10 Save and Exit
                                                 ESC Exit

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```

NOTE: The options for the System Setup program change based on the system configuration.

NOTE: The System Setup program defaults are listed under their respective options in the following sections, where applicable.

BIOS Firmware

Option	Description
Version	Displays the BIOS version.
Build Data	Displays the BIOS build date.

System Firmware

Option	Description
BMC FW	Displays the system BMC firmware version.
PIC FW	Displays the system PIC firmware version.

Product Information

Option	Description
Name	Displays the name of the product.
AssetTag	Displays the asset tag of the product.
ServiceTag	Displays the service tag of the product.
ePPID	Displays the eppid of the product.

Processor

Option	Description
Name	Displays the processor name.
Speed	Displays the maximum speed of the processor.
Count	Displays the physical processor count.

System Memory

Option	Description
Size	Displays the total system memory size installed on the system board.
System Date	Displays the current date.
System Time	Displays the current time.

Advanced Menu

This option displays a table of items that defines advanced information about your system.

⚠ **CAUTION: Making incorrect settings to items on these pages may cause the system to malfunction. Unless you have experience adjusting these items, we recommend that you leave these settings at the default values. If making settings to items on these pages causes your system to malfunction or prevents the system from booting, open BIOS and choose Load Optimal Defaults in the Exit menu to boot up normally.**

```
                         BIOS SETUP UTILITY
       Main     Advanced    Boot    Server    Security    Exit
    Advanced Settings                              Configure CPU.
    WARNING :   Setting wrong values in below sections
                may cause system to malfunction.

    ▶ CPU Configuration
    ▶ Memory Configuration
    ▶ IDE Configuration
    ▶ Hyper Transport Configuration
    ▶ PCI Configuration
    ▶ USB Configuration

                                               ←→  Select Screen
                                               ↑↓  Select Item
                                               Enter Go to Sub Screen
                                               F1   General Help
                                               F10  Save and Exit
                                               ESC  Exit

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CPU Configuration

Scroll to this item and press **Enter** to view the following screen:

```
                        BIOS SETUP UTILITY
       Advanced
   CPU Configuration                            Configure Power
   Module Version: 5.1104.1                     Management.
   Socket Count  : 2
   Node Count    : 2
   Core Count    : 12
   AMD Opteron(tm) Processor 4176HE
   Revision:  D1
   Cache L1:  768KB
   Cache L2:  3072KB
   Cache L3:  6MB
   Speed   :  2100MHz,  NB Clk 2200MHz
   Able to Change Freq. : Yes
   uCode Patch Level  : 0x10000C4              ←→  Select Screen
   ► Power Management                          ↑↓  Select Item
   GART Error Report       [Disabled]          Enter Go to Sub Screen
   Secure Virtual Machine [Enabled]            F1   General Help
   ACPI SRAT Table         [Enabled]           F10 Save and Exit
   L3 Power Control        [Enabled]           ESC Exit
   Prob filter Mode        [Auto]

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```

Option	Description
Module Version	Displays the current processor module version.
Socket Count	Displays the processor socket count.
Node Count	Displays the node count.
Core Count	Displays the processor core count.
Revision	Displays the processor version.
Cache L1	Displays the size of CPU L1.
Cache L2	Displays the size of CPU L2.
Cache L3	Displays the size of CPU L3.
Speed	Displays the frequency of CPU.
Able to change Freq.	Displays the capable of frequency change.
uCode Patch Level	Displays the ucode patch level.
Power Management	Configures Power Management.
GART Error Report (**Disabled** default)	This option should remain disabled for the normal operation. The driver developer may enable it for testing purpose.
Secure Virtual Machine (**Enabled** default)	Selects this item to enable or disable the function of securing virtual machine mode (SVM).
ACPI SRAT Table (**Enabled** default)	Selects this item to enable or disable the building of ACPI SRAT table.
L3 Power Control (**Enabled** default)	Selects Enabled to stop the clock of idle sub-caches in the L3.
Probe Filter Mode (**Auto** default)	Selects Auto or Disabled to probe filter mode on or off.

```
                        BIOS SETUP UTILITY
         Advanced
 Power Management                                   This field sets the
 Power Management            [OS Control]           System PowerManagement
 CPU Power Capping           [P-state 0]            to Maximum Performance
 PSU Power Capping           [150]                  mode, OS Control mode,
                                                    or Advanced Platform
                                                    Management Link mode.
                                                    When set to APML mode,
                                                    you can change setting
                                                    of PSU Power Capping
                                                    option.


                                                    ←→ Select Screen
                                                    ↑↓ Select Item
                                                    +-  Change Option
                                                    F1  General Help
                                                    F10 Save and Exit
                                                    ESC Exit

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```

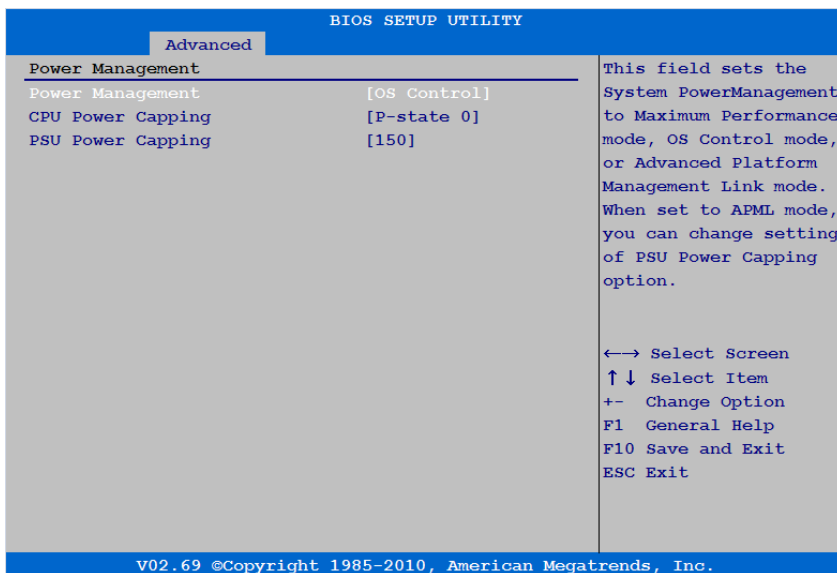| Option	Description
Power Management (**OS Control** default)	This field sets the System Power Management to Maximum Performance mode, OS Control mode, or Advanced Platform Management Link mode. When set to APML mode, you can change setting of PSU Power Capping options.
CPU Power Capping (**P-state 0** default)	This option can decide the highest performance P-state in OS. This setting only can be seen when "Power Management" be selected to "OS Control" mode.
PSU Power Capping (**150** default)	The setting controls PSU Power, its range limited in 150~2000W. The value will send to BMC by IPMI command and BMC will control PSU power. This setting only can be seen when "Power Management" be selected to "APML" mode and the system board at location 4 in the chassis.

Memory Configuration

Scroll to this item and press **Enter** to view the following screen:

```
                        BIOS SETUP UTILITY
        Advanced
  Memory Configuration                         Reserve a spare memory
  CS Sparing Enable            [Disabled]      rank in each channel.



                                               ←→ Select Screen
                                               ↑↓ Select Item
                                               +- Change Option
                                               F1 General Help
                                               F10 Save and Exit
                                               ESC Exit


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```
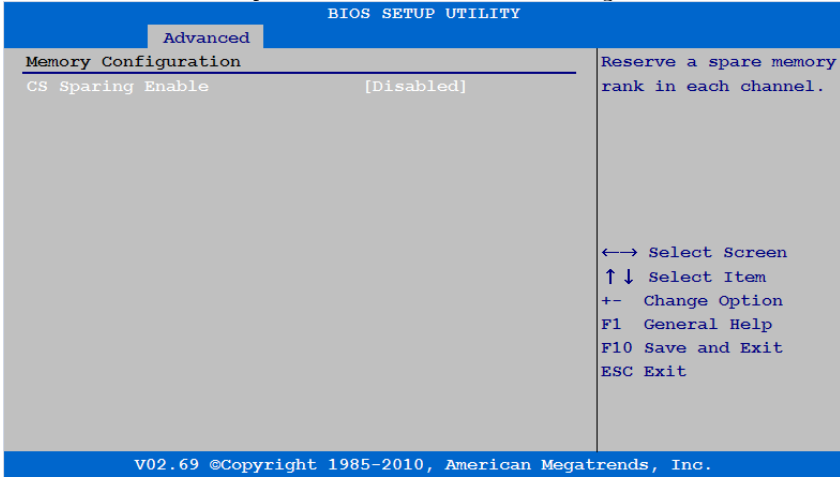
Option	Description
CS Sparing Enable (**Disabled** default)	Reserve a spare memory rank in each channel.

SATA Configuration

Scroll to this item and press **Enter** to view the following screen:

```
                        BIOS SETUP UTILITY
     Advanced
  SATA Configuration                            Disable/Enable onboard
                                                SATA Controller
  OnChip SATA Channel          [Enabled]        (Bus0:Dev17:Fun0).
  OnChip SATA Type             [Native IDE]
  SATA IDE Combined Mode       [Enabled]

  ▶ SATA Port1                 : [Hard Disk]
  ▶ SATA Port2                 : [Not Detected]
  ▶ SATA Port3                 : [Not Detected]
  ▶ SATA Port4                 : [Not Detected]
  ▶ SATA Port5                 : [Not Detected]
  ▶ SATA Port6                 : [Not Detected]

  Power Saving Features        [Disabled]       ←→  Select Screen
  Sata-AHCI Ports Auto Clk Ctrl [Enabled]       ↑↓  Select Item
  Sata-IDE Ports Auto Clk Ctrl [Enabled]        +-  Change Option
  SATA Smbus Interface         [Disabled]       F1  General Help
                                                F10 Save and Exit
                                                ESC Exit


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```

Option	Description
OnChip SATA Channel (**Enabled** default)	Selects this item to enable or disable Onboard SATA controller.
OnChip SATA Type (**Native IDE** default)	Native IDE: Native mode. AMD_AHCI: Use AMD AHCI option ROM. IDE->AMD_AHCI: No AHCI option ROM, use AMD AHCI driver (need load driver when install OS, windows 2008 R2 had native support.)
SATA IDE Combined Mode (**Enabled** default)	Selects this item to enable or disable SATA IDE combined mode.

Option	Description
SATA Port1~6	While entering Setup, BIOS auto-detects the presence of SATA devices and displays the status of detected SATA HDDs.
Power Saving features (**Disabled** default)	Selects this item to enable or disable power saving features in SB.
SATA-AHCI Ports Auto Clk Ctrl (**Enabled** default)	To enable this option will shutdown the clocks for unused SATA ports in AHCI modes. This will enable some power savings. But please note that if you shutdown the clock, then hot-plug for that port will not work.
SATA-IDE Ports Auto Clk Ctrl (**Enabled** default)	To enable this option will shutdown the clocks for unused SATA ports in IDE modes. It will enable some power savings. But please note that if you shut clock, then hot-plug for that port will not work.
SATA Smbus Interface (**Disabled** default)	Selects this item to enable or disable SATA SMBUS Interface.

Select SATA Port 1-6 to configure each device on the SATA channel using
the following screen:

```
                            BIOS SETUP UTILITY
              Advanced
    SATA Port1
    Device      :Hard Disk
    Vendor      :Hitachi HUA721050KLA330
    Size        :500.1GB


                                              ←→  Select Screen
                                              ↑↓  Select Item
                                              F1   General Help
                                              F10  Save and Exit
                                              ESC  Exit



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```
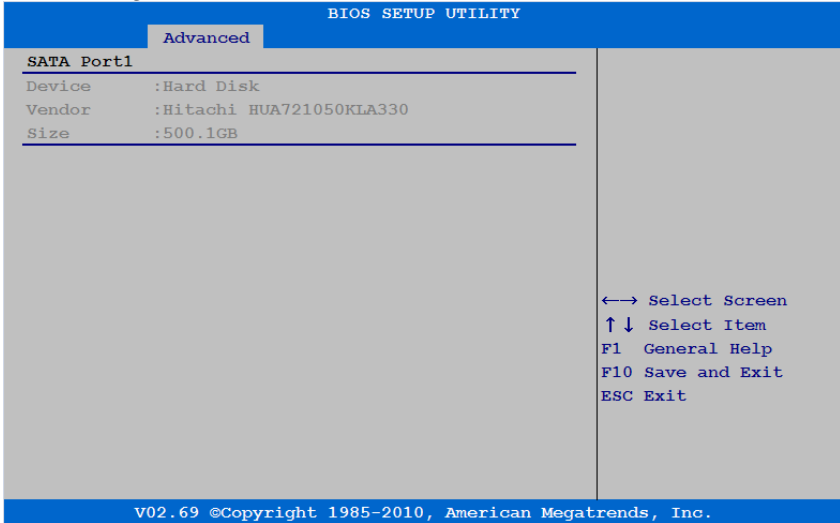
Option	Description
Device	Displays the type of device assigned to this channel.
Vendor	Displays the manufacture's name of the device.
Size	Displays the size of the device (GB).

Hyper Transport Configuration

Scroll to this item and press **Enter** to view the following screen:

```
                        BIOS SETUP UTILITY
        Advanced
  Hyper Transport Configuration                      Coherent
  Coherent HT Link Speed        [HT3]                HT Link Frequency
  Non-Coherent HT Link Speed    [HT3 2600MHz]
  Non-Coherent HT Link Width    [16 bits]
  2nd HT Link                   [Enabled]


                                                     ←→  Select Screen
                                                     ↑↓  Select Item
                                                     +-  Change Option
                                                     F1  General Help
                                                     F10 Save and Exit
                                                     ESC Exit


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```
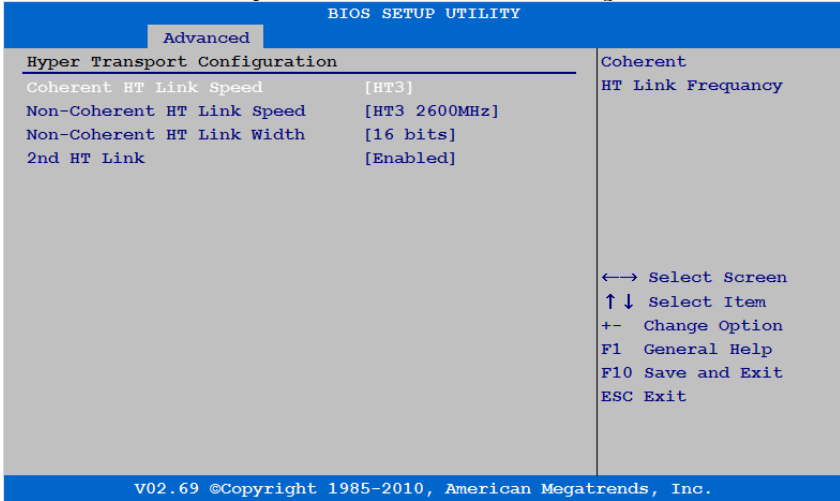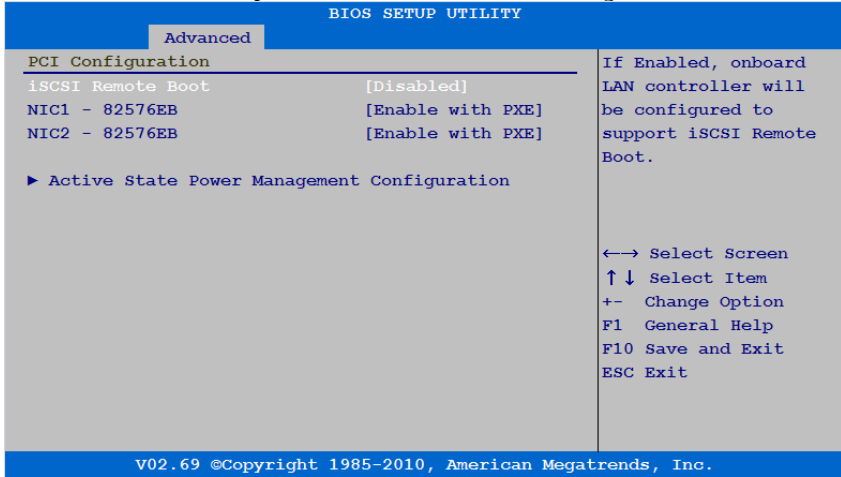
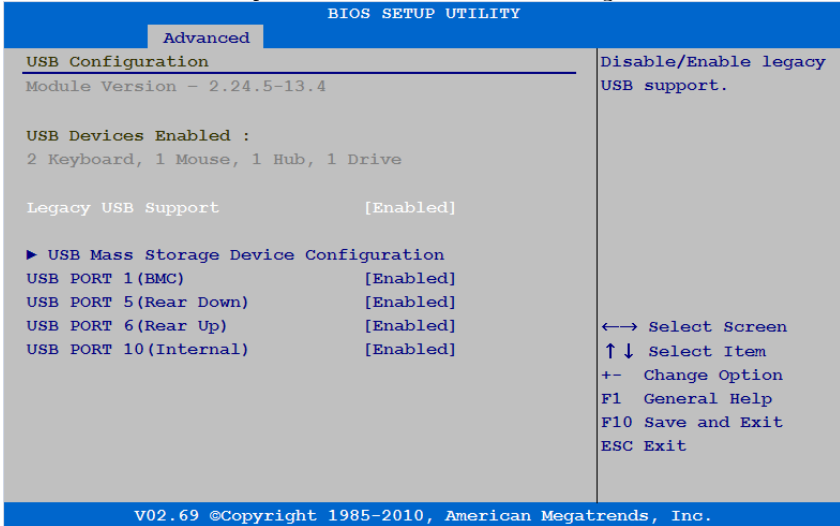| Option	Description
Coherent HT Link Speed (**HT3** default)	Selects coherent HT link frequency.
Non-Coherent HT Link Speed (**HT3 2600MHz** default)	This option is to set Non-Coherent HT Link frequency and will base on CPU core number to have different selections. For 4 core processor: HT1 800/1000, HT3 1200/1600/2000/2600 For 6 core processor: HT3 1200/1600/2000/2600
Non-Coherent HT Link Width (**16bits** default)	Selects non-coherent HT link width.
2nd HT Link (**Enabled** default)	Selects this item to enable or disable the 2nd HT link between socket 0 and socket 1.

PCI Configuration

Scroll to this item and press **Enter** to view the following screen:

```
                         BIOS SETUP UTILITY
          Advanced
  PCI Configuration                              If Enabled, onboard
  iSCSI Remote Boot              [Disabled]      LAN controller will
  NIC1 - 82576EB                 [Enable with PXE] be configured to
  NIC2 - 82576EB                 [Enable with PXE] support iSCSI Remote
                                                  Boot.
  ▶ Active State Power Management Configuration


                                                  ←→  Select Screen
                                                  ↑↓  Select Item
                                                  +-  Change Option
                                                  F1  General Help
                                                  F10 Save and Exit
                                                  ESC Exit


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```

Option	Description
iSCSI Remote Boot (**Disabled** default)	If Enabled, onboard LAN controller will be configured to support iSCSI Remote Boot.
NIC1-82576EB (**Enable without PXE** default)	Selects this item to enable or disable onboard NIC1 controller and PXE support. This item only can be seen if "iSCSI Remote Boot" is Disabled.
NIC2-82576EB (**Enable without PXE** default)	Selects this item to enable or disable onboard NIC2 controller and PXE support. This item only can be seen if "iSCSI Remote Boot" is Disabled.
Active State Power Management Configuration	To control Active State Power Management (ASPM).

USB Configuration

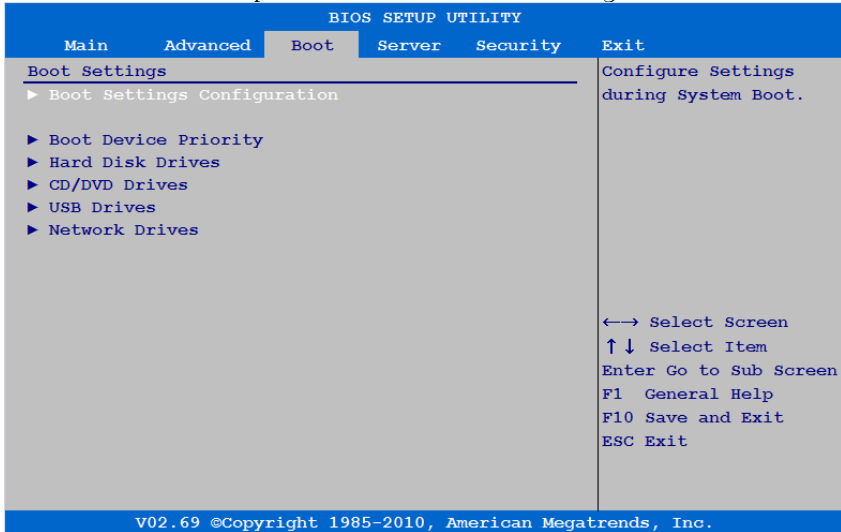Scroll to this item and press **Enter** to view the following screen:

```
                         BIOS SETUP UTILITY
         Advanced
    USB Configuration                          Disable/Enable legacy
    Module Version - 2.24.5-13.4               USB support.


    USB Devices Enabled :
    2 Keyboard, 1 Mouse, 1 Hub, 1 Drive


    Legacy USB Support              [Enabled]

    ▶ USB Mass Storage Device Configuration
    USB PORT 1(BMC)                 [Enabled]
    USB PORT 5(Rear Down)           [Enabled]
    USB PORT 6(Rear Up)             [Enabled]    ←→ Select Screen
    USB PORT 10(Internal)           [Enabled]    ↑↓ Select Item
                                                 +-  Change Option
                                                 F1  General Help
                                                 F10 Save and Exit
                                                 ESC Exit


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```

Option	Description
Module Version	Displays the module version.
USB Devices Enabled	Displays USB devices currently detected.
Legacy USB Support (**Enabled** default)	Selects this item to enable or disable legacy USB support.
USB Port 1(BMC) (**Enabled** default)	Selects these items to enable or disable the corresponding USB port.
USB Port 5 (Rear Down) (**Enabled** default)	Selects these items to enable or disable the corresponding USB port.

Option	Description
USB Port 6 (Rear Up) (**Enabled** default)	Selects these items to enable or disable the corresponding USB port.
USB Port 10 (Internal) (**Enabled** default)	Selects these items to enable or disable the corresponding USB port.

Boot Menu

This page enables you to set POST boot parameters.
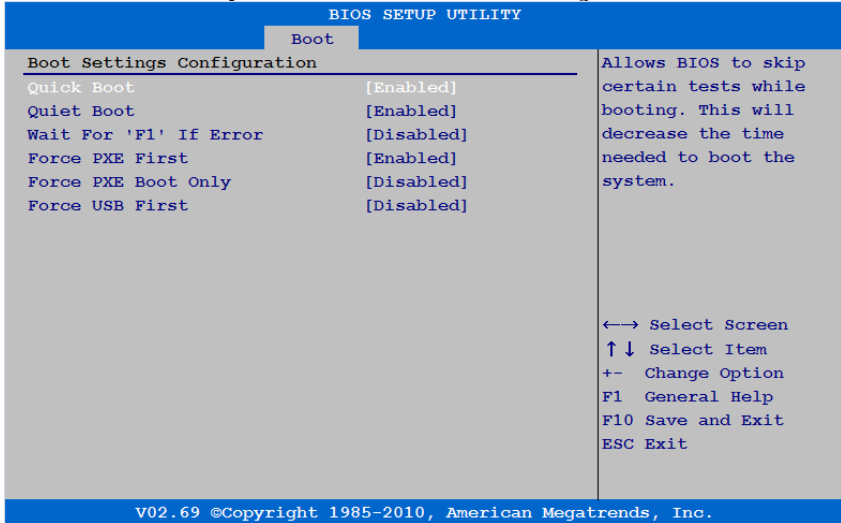Scroll to this item and press **Enter** to view the following screen:

```
                          BIOS SETUP UTILITY
    Main      Advanced    Boot    Server    Security    Exit

  Boot Settings                              Configure Settings
  ► Boot Settings Configuration              during System Boot.

  ► Boot Device Priority
  ► Hard Disk Drives
  ► CD/DVD Drives
  ► USB Drives
  ► Network Drives



                                             ←→  Select Screen
                                             ↑↓  Select Item
                                             Enter Go to Sub Screen
                                             F1  General Help
                                             F10 Save and Exit
                                             ESC Exit


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```

Option	Description
Boot Settings Configuration	Configures the settings during system boots.
Boot Device Priority	Specifies the boot device priority sequence.

Option	Description
Hard Disk Drives	Specifies the boot device priority sequence from the available hard drives. This item only can be seen when system have bootable Hard Disk Drives.
CD/DVD Drives	Specifies the boot device priority sequence from available CD/DVD Drives. This item only can be seen when system have bootable CD/DVD Drives.
USB Drives	Specifies the boot device priority sequence from available USB Drives. This item only can be seen when system have bootable USB Drives.
Network Drives	Specifies the boot device priority sequence from available Network Drives. This item only can be seen when system have bootable Network Drives (PXE).

Boot Settings Configuration

Select this item and press **Enter** to view the following submenu items:

```
                    BIOS SETUP UTILITY
              Boot
   Boot Settings Configuration              Allows BIOS to skip
   Quick Boot                 [Enabled]     certain tests while
   Quiet Boot                 [Enabled]     booting. This will
   Wait For 'F1' If Error     [Disabled]    decrease the time
   Force PXE First            [Enabled]     needed to boot the
   Force PXE Boot Only        [Disabled]    system.
   Force USB First            [Disabled]

                                            ←→  Select Screen
                                            ↑↓  Select Item
                                            +-  Change Option
                                            F1  General Help
                                            F10 Save and Exit
                                            ESC Exit

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```

Option	Description
Quick Boot (**Enabled** default)	Allow BIOS to skip certain tests while booting, which will decrease the time needed to boot the system.
Quiet Boot (**Enabled** default)	Disabled: displays normal POST messages. Enabled: displays OEM logo instead of POST messages.
Wait For 'F1' if Error (**Disabled** default)	Wait for F1 key to be pressed if error occurs.
Force PXE First (**Enabled** default)	Enables or disables PXE to be the first boot device. It will take effect on the next boot.
Force PXE Boot Only (**Disabled** default)	Enables or disables PXE to be the Only boot device.

Option	Description
Force USB First (**Disabled** default)	Enable or disable USB to be the first boot device, the priority is higher than PXE. It will take effect on the next boot.

Boot Device Priority

Select this item and press **Enter** to view the following submenu items:

```
                         BIOS  SETUP  UTILITY
                    Boot
  Boot Device Priority                           Specifies  the  boot
  1st Boot Device            [SATA:P1-ST380815AS] sequence  from  the
  2nd Boot Device            [Network:IBA GE SLO] available  devices.

                                                  A device  enclosed  in
                                                  parenthesis  has  been
                                                  disabled  in  the
                                                  corresponding  type
                                                  menu.


                                                  ←→  Select  Screen
                                                  ↑↓  Select  Item
                                                  +-   Change  Option
                                                  F1   General  Help
                                                  F10  Save  and  Exit
                                                  ESC  Exit


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```
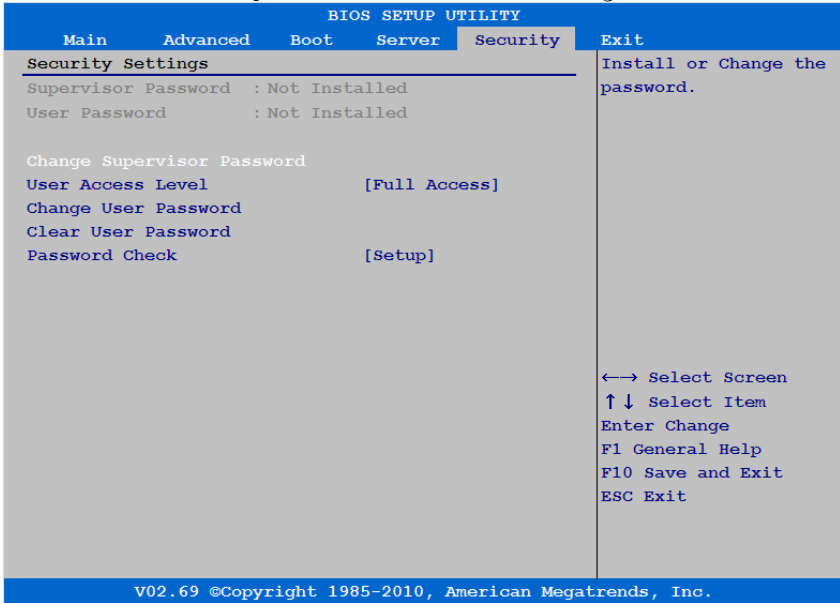
Server Menu

This page enables you to configure Server parameters.
Scroll to this item and press **Enter** to view the following screen:

```
                          BIOS SETUP UTILITY
      Main      Advanced    Boot    Server    Security    Exit
    Server Configuration                             InPut for Set LAN
    Status of BMC                 Working           Configuration command.
    IPMI Specification Version    2.0               See IPMI 2.0 Spec,
    BMC Firmware Version          01 01.04          table 23-1.
    PIC Firmware Version          N/A
                                                    NOTE: Each question in
    NIC1 MAC Address              [00-23-8B-DF-C1-60]  this group may take
    NIC2 MAC Address              [00-23-8B-DF-C1-61]  considerable amount of
                                                    time.
    ▶ Set BMC LAN Configuration

    ▶ Remote Access Configuration
    Restore on AC Power Loss      [Power On]        ←→ Select Screen
    Power Staggering AC Recovery  [User Defined]    ↑↓ Select Item
    Power On Delay                [    0]           Enter Go to Sub Screen
    Mininmun Power On Delay : 00000                 +/- Change Option
    Maxinmun Power On Delay : 00255                 F1  General Help
                                                    F10 Save and Exit
                                                    ESC Exit
    Event Control Interface
    ▶ View BMC System Event Log
    Clear BMC System Event Log

    Event Logging                 [Enabled]
    NMI on Error                  [Disabled]
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```

Option	Description
Status of BMC	Displays the BMC status.
IPMI Specification Version	Displays the IPMI specification version.
BMC Firmware Version	Displays the BMC firmware version.
PIC Firmware Version	Displays the PIC firmware version.
NIC1 MAC Address	Displays the NIC1 MAC address.
NIC2 MAC Address	Displays the NIC2 MAC address.

Option	Description
Set BMC LAN Configuration	Inputs for Set LAN Configuration command. Each item in this group may take considerable amount of time.
Remote Access Configuration	Configures Remote Access.
Restore on AC Power Loss (**Power Off** default)	System action to take on AC power loss recovery.
Power Staggering AC Recovery (**Immediate** default)	Configures power recovery behavior. This item only can be seen when "Remote on AC Power Loss" be selected in "Power On" or "Last State".
Power On Delay (user defined)	Configures time for power on delay, the setting range of delay time is 0~255sec.
View BMC System Event Log	View all events in the BMC Event Log. It will take a max. of 15 seconds to read all BMC SEL records.
Clear BMC System Event Log	Clears all events in the BMC Event Log.
Event Logging (**Enabled** default)	Enables or disables BIOS to log system events to BMC, errors include ECC/PCI/PCI-E/HT…etc.
NMI on Error (**Disabled** default)	Enables or disables BIOS to generate NMI when uncorrectable errors occur.

LAN Configuration

Select Set BMC LAN Configuration to view the following submenu:

```
                        BIOS SETUP UTILITY
      Main      Advanced     Boot    Server    Security    Exit
   LAN Configuration                               Set BMC LAN Port to
   Channel Number                 [01]             Dedicated-NIC or
   Channel Number Status:         Channel number is OK    Shared-NIC.

   BMC LAN Port Configuration     [Shared-NIC]

   DHCP Enabled                   [Enabled]
   IP Address                     [192.168.001.002]
   Subnet Mask                    [255.255.255.000]       ←→ Select Screen
   GateWay Address                [192.168.001.001]       ↑↓ Select Item
   Current Mac address in BMC:    CB.0A.A9.9D.FE.8F        +/- Change Option
                                                          F1  General Help
                                                          F10 Save and Exit
                                                          ESC Exit



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```

Option	Description
Channel Number	Displays the channel number.
Channel Number Status	Displays the channel number status.
BMC LAN Port Configuration (**Shared-NIC** default)	Sets BMC LAN Port to dedicated-NIC or shared-NIC.
DHCP Enabled (**Enabled** default)	Enables or disables BMC LAN to get LAN IP from DHCP.
IP Address (Input by user)	Uses this screen to input IP address.
Subnet Mask (Input by user)	Uses this screen to input subnet mask address.

Option	Description
Gateway Address (Input by user)	Uses this screen to input Gateway address.
Current Mac address in BMC	Displays the current Mac address in BMC.

Remote Access Configuration

Select Remote Access Configuration to view the following submenu:

```
                          BIOS SETUP UTILITY
     Main      Advanced     Boot    Server     Security    Exit
   Configure Remote Access Type and parameters        Enable EMS support.
   EMS support(SPCR)              [Disable]           Include ACPI SPCR
   Remote Access                  [Enabled]           table pointer to
                                                      RSDT pointer list.
   Serial port number             [COM2]
        Base Address, IRQ         [2F8h, 3]
   Current SOL Baud Rate :        115200 bps
   Serial Port Mode               [115200 8,n,1]
   Flow Control                   [None]
   Redirection After BIOS POST    [Always]
   Terminal Type                  [ANSI]
   VT-UTF8 Combo Key Support      [Enabled]

                                                      ←→  Select Screen
                                                      ↑↓  Select Item
                                                      +-   Change Option
                                                      F1   General Help
                                                      F10 Save and Exit
                                                      ESC Exit

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```

Option	Description
EMS support (SPCR) (**Disabled** default)	Enables or disables EMS support, including ACPI SPCR table pointer to RSDT pointer list.
Remote Access (**Enabled** default)	Enables or disables remote access support.

Option	Description
Serial Port Number (**COM2** default)	Selects serial port for console redirection.
Serial Port Mode (**115200 8,n,1** default)	Selects serial port settings.
Flow Control (**None** default)	Selects flow control for console redirection.
Redirection After BIOS POST (**Always** default)	Disabled: turn offs the redirection after POST. Always: Redirection is always active. (Some Oss may not work if set to Always.)
Terminal Type (**ANSI** default)	Selects the target terminal type.
VT-UTF8 Combo Key Support (**Enabled** default)	Enables or disables VT-UTF8 combination key support for ANSI/VT100 terminals.

View BMC System Event Log

Select this item to view the following submenu:

```
                        BIOS SETUP UTILITY
                           Server
  Total Number Of Entries:            60          Use +/- to traverse
  SEL Entry Number                    [1]          the event log.
  SEL Record ID:             0001
  SEL Record Type            02(System Event)
  Event Timestamp:           12s from SEL init
  Generator ID:              0020
  Event Message Format Ver:  04 (IPMI ver 2.0)
  Event Sensor Type:         02 (Voltage)
  Event Sensor Number:       12                  ←→  Select Screen
  Event Dir Type:            01                  ↑↓  Select Item
  Event Data:                57 C3 1D            +-  Change Option
  - Upper Non-critical - going high             F1  General Help
  - N/A                                         F10 Save and Exit
  - N/A                                         ESC Exit


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```

Security Menu

This page enables you to set the security parameters.
Scroll to this item and press **Enter** to view the following screen:

```
                          BIOS SETUP UTILITY
      Main      Advanced     Boot    Server    Security     Exit
   Security Settings                                 Install or Change the
   Supervisor Password   : Not Installed             password.
   User Password         : Not Installed

   Change Supervisor Password
   User Access Level               [Full Access]
   Change User Password
   Clear User Password
   Password Check                  [Setup]


                                                  ←→ Select Screen
                                                  ↑↓ Select Item
                                                  Enter Change
                                                  F1 General Help
                                                  F10 Save and Exit
                                                  ESC Exit


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```

Option	Description
Supervisor Password	Displays whether the supervisor password is installed or not.
User Password	Displays whether the user password is installed or not.
Change Supervisor Password	Installs or changes the password.

Option	Description
User Access Level (**Full Access** default)	Limited: allows only limited fields to be changed such as Date and Time. No Access: prevents User access to the Setup Utility. View Only: allows access to the Setup Utility but the fields cannot be changed. This item only can be seen when the Supervisor password is installed.
Change User Password	Installs or changes the password.
Clear User Password	Immediately clears the User password. This item only can be seen when the user password is installed.
Password Check (**Setup** default)	Setup: Check password while invoking setup. Always: Check password while invoking setup as well as on each boot. This item only can be seen when the supervisor or the user password is installed.

Exit Menu

Scroll to this item and press **Enter** to view the following screen:

```
                           BIOS SETUP UTILITY
      Main      Advanced    Boot    Server    Security      Exit
  Exit Options                                         Exit system setup
  Save Changes and Exit                                After saving the
  Discard Changes and Exit                             changes.
  Discard Changes
                                                       F10 key can be used
  Load Optimal Defaults                                for this operation.
  Load 2nd Defaults
  Save 2nd Defaults




                                                       ←→ Select Screen
                                                       ↑↓ Select Item
                                                       Enter Go to Sub Screen
                                                       F1 General Help
                                                       F10 Save and Exit
                                                       ESC Exit


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```

Option	Description
Save Changes and Exit	Exit system setup after saving the changes. F10 key can be used for this operation.
Discard Changes and Exit	Exit system setup without saving any changes. ESC key can be used for this operation.
Discard Changes	Discards changes done so far to any of the setup questions. F7 key can be used for this operation.
Load Optimal Defaults	Load optimal default values for all the setup questions. F9 key can be used for this operation.

Option	Description
Load 2nd Defaults	Load second default values for all the setup questions. This item only selectable if 2nd Defaults was saved before. The first time to save 2nd Default in setup, the item will not be displayed immediately, only available from the next boot.
Save 2nd Defaults	Save all setup questions' current value as second default.

3

Installing System Components

Safety Instructions

⚠️ **WARNING: Working on systems that are still connected to a power supply can be extremely dangerous.**

⚠️ **CAUTION: System components and electronic circuit boards can be damaged by discharge of static electricity.**

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

To avoid injury to yourself or damage to your system, follow these guidelines:
- Always disconnect the system from the power outlet whenever you are working inside the system.
- If possible, wear a grounded wrist strap when you are working inside the system. Alternatively, discharge any static electricity by touching the bare metal chassis of the system case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Do not flex or stress the circuit board.
- Leave all components inside the static-proof packaging until you are ready to use the component for the installation.

Recommended Tools

- Phillips screwdriver
- Flat-tipped screwdriver
- Set of jewelers screwdrivers

Inside the System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠ **CAUTION: This system must be operated with the system cover installed to ensure proper cooling.**

✎ **NOTE:** The illustration in this section shows a system with 3.5-inch hard drives.

Figure 3-1. Inside the System
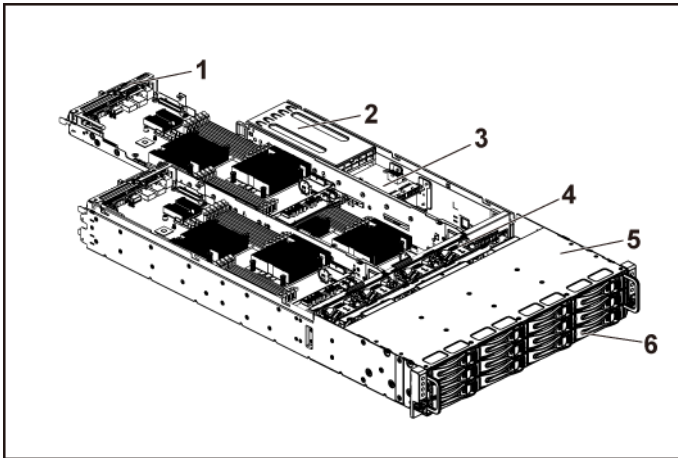
1	system board assembly (4)	2	power supply (2)
3	power distribution board (2)	4	cooling fan (4)
5	hard-drive bay	6	hard drive (12)

Hard Drives

The installation and removal procedures for the 3.5-inch hard drive and the 2.5-inch hard drive are similar. Following is an example showing the replacement procedure of a 3.5-inch hard drive.

Removing a Hard-Drive Blank

⚠ **CAUTION: To maintain proper system cooling, all empty hard-drive bays must have drive blanks installed.**

✎ **NOTE:** This section is applicable to systems with hot-swappable hard drives only.

1 Turn the lock lever counterclockwise until it points to the unlock symbol.
2 Slide the release button to open the release handle. See Figure 3-2.
3 Using the release handle, pull the hard-drive blank out of the hard-drive bay.

Figure 3-2. Removing or Installing a Hard-Drive Blank
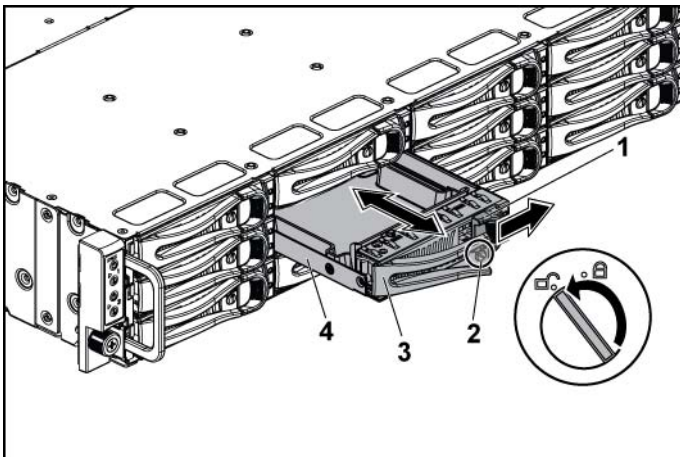
1	release button	2	lock lever
3	release handle	4	hard-drive blank

Installing a Hard-Drive Blank

1 With the lever on the hard-drive blank open, slide the hard-drive blank into the drive bay until the hard-drive blank makes contact with the backplane. See Figure 3-2.
2 Close the release handle to lock the hard drive blank in place.
3 Turn the lock lever clockwise to the lock symbol. See Figure 3-2.

Removing a Hard-Drive Carrier

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn the lock lever counterclockwise until it points to the unlock symbol.
2 Slide the release button to open the release handle. See Figure 3-3.
3 Using the release handle, pull the hard-drive carrier out of the hard-drive bay.

⚠ **CAUTION: To maintain proper system cooling, all empty hard-drive bays must have drive blanks installed.**

Figure 3-3.   Removing and Installing a Hard-Drive Carrier
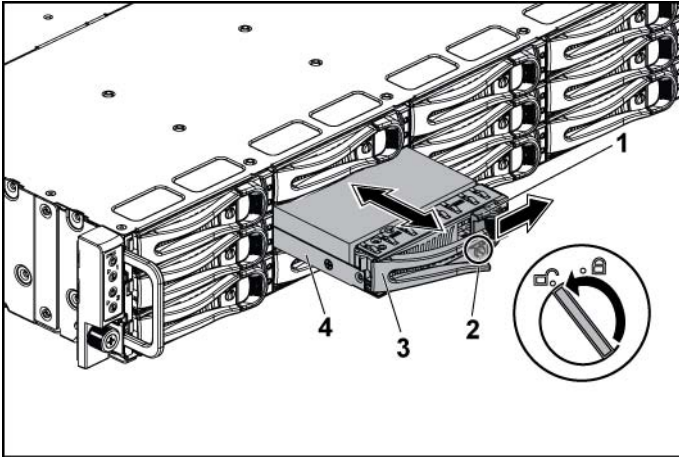
1	release button	2	lock lever
3	release handle	4	hard-drive carrier

Installing a Hard-Drive Carrier

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 With the lever on the hard-drive carrier open, slide the hard-drive carrier into the drive bay until the hard-drive carrier makes contact with the backplane. See Figure 3-3.

2 Close the release handle to lock the hard drive in place.

3 Turn the lock lever clockwise to the lock symbol. See Figure 3-3.

Removing a Hard Drive From a Hard-Drive Carrier

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

⚠ CAUTION: Combining SATA and SAS hard drives in the same system configuration is not supported.

⚠ CAUTION: Use only hard drives that have been tested and approved for use with the SAS/SATA backplane.

⚠ CAUTION: When installing a hard-drive carrier, ensure that the adjacent drives are fully installed. Inserting a hard-drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

⚠ CAUTION: To prevent data loss, ensure that your operating system supports hot-swappable drive installation. See the documentation supplied with the operating system.

1   Remove the four screws. See Figure 3-4.
2   Lift the hard drive out of the hard-drive carrier.

Figure 3-4. Removing and Installing a Hard Drive from the Hard-Drive Carrier
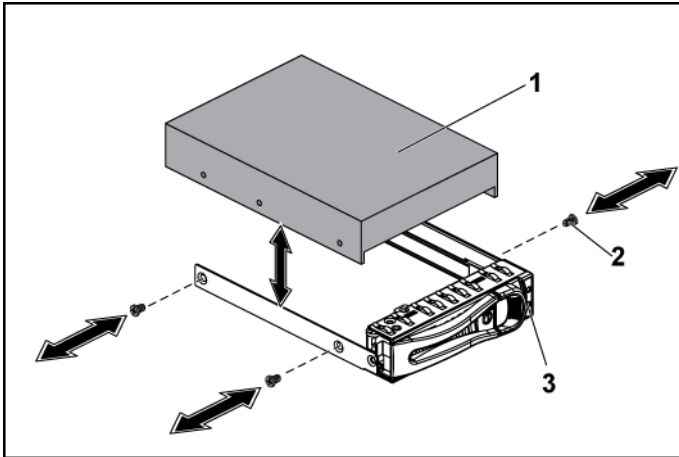
1	hard drive	2	screw (4)
3	hard-drive carrier		

Installing a Hard Drive into a Hard-Drive Carrier

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Place the hard drive into the hard-drive carrier. See Figure 3-4.

2 Secure the hard drive to the hard-drive carrier with four screws. See Figure 3-4.

Power Supplies

NOTE: The following table lists the maximum supported configuration where power supply redundancy is guaranteed.

NOTE: Configurations higher than indicated in the table may change the power supply mode to non-redundant. In non-redundant mode if the power requirement exceeds the installed system power capacity, the BIOS will throttle the CPUs. Also, if CPU Power Capping is enabled, then CPU throttling occurs on configurations that exceed the cap value.

Table 3-1. PSU and System Board Support Matrix

PSU	Two System Boards	Four System Boards
1400W	Full configuration*	Up to two 95W processors / MLB, two hard drives / MLB, and four memory modules / MLB
1100W	Full configuration*	Up to two 65W processors / MLB, one hard drives / MLB, and six memory modules / MLB
750W	Up to two 95W processors / MLB, two hard drives / MLB, and four memory modules / MLB	N/A
470W	Up to two 35W processors / MLB, up to one hard drives / MLB, and three memory modules / MLB	N/A

Recommended Configuration

Memory - 4G, 1333, 2Rx4X72, 8, 240
HDD - 600G, SAS6, 15K, 3.5, SGT

Full Configuration

This includes full quantity of processors (95W), memory (4G, 1333, 2R) and HDD (600G, SAS6, 15K, 3.5).

Removing a Power Supply

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠ **CAUTION: The System requires one power supply to operate normally.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2 Disconnect the power cable from the power source and the power supply.
3 Press the release lever and using the handle, slide the power supply out of the system. See Figure 3-5.

   📝 **NOTE:** Removing the power supply may require considerable force.

Figure 3-5. Removing and Installing a Power Supply
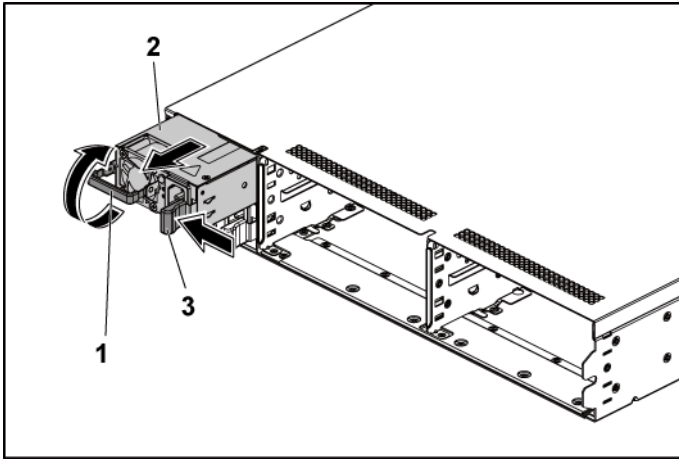
1	handle	2	power supply
3	release lever		

Installing a Power Supply

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠️ **CAUTION: The System requires one power supply to operate normally.**

1 Verify that both power supplies are of the same type and have the same maximum output power.

📝 **NOTE:** The maximum output power is printed on the power supply label.

2 Slide the new power supply into the chassis until the power supply is fully seated and the release lever snaps into place. See Figure 3-5.

3 Connect the power cable to the power supply and plug the cable into a

power outlet.

NOTE: When installing a new power supply in a system with two power supplies, allow several seconds for the system to recognize the power supply and determine its status.

System-Board Assembly

Removing a System-Board Assembly

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1   Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2   Disconnect all the external cables from the system board.

3   Remove the screw that secures the retaining latch. See Figure 3-6.

4   Press the retaining latch and using the handle, slide the system-board assembly out of the chassis. See Figure 3-6.

Figure 3-6. Removing and Installing a System-Board Assembly
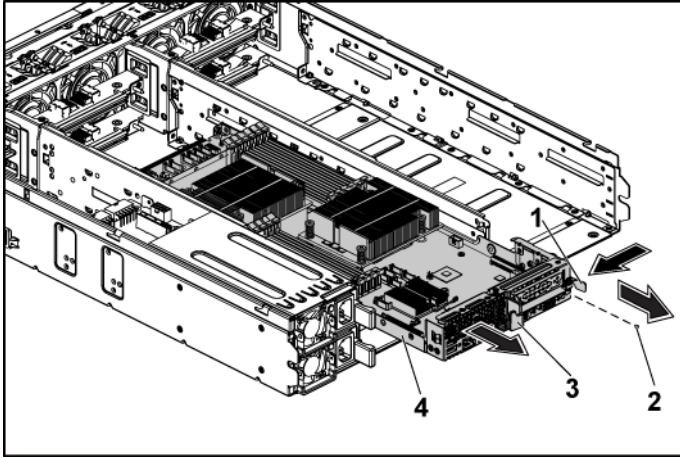
1	retaining latch	2	screw
3	handle	4	System-board assembly

Installing a System-Board Assembly

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Slide the system-board assembly into the chassis until it snaps into place. See Figure 3-6.
2 Reconnect all the external cables to the system board.
3 Replace the screw that secures the retaining latch. See Figure 3-6.
4 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Heat Sinks

Removing the Heat Sink

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2   Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

⚠ **WARNING: The heat sink may be hot to touch for some time after the system has been powered down. Allow the heat sink to cool before removing it.**

⚠ **CAUTION: Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.**

3   Using a Phillips screwdriver, loosen one of the heat-sink retention screws. See Figure 3-7.
    Wait for 30 seconds for the heat sink to loosen from the processor.
4   Remove the other three heat-sink retention screws.
5   Gently lift the heat sink off the processor and set the heat sink aside with thermal grease side facing up.

Figure 3-7.   Removing and Installing the Heat Sink
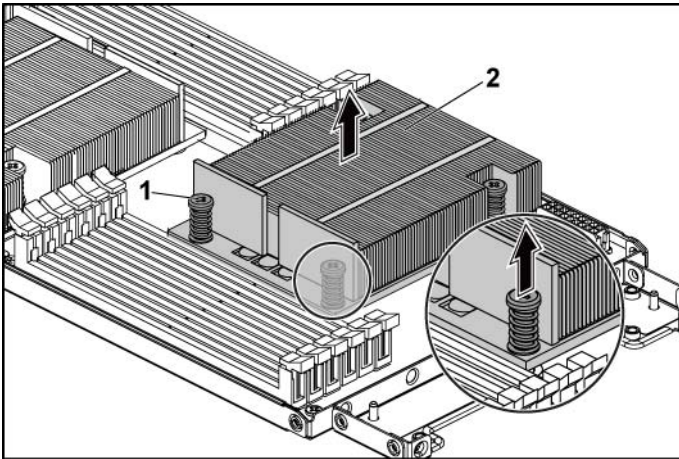
| 1 | screw (4) | 2 | heat sink |

Installing the Heat Sink

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Using a clean lint-free cloth, remove the thermal grease from the heat sink.

2   Apply new thermal grease evenly to the center of the top of the new processor.

⚠️ **CAUTION: Using excess thermal grease can cause grease to contact the processor shield, which can cause contamination of the processor socket.**

3   Place the heat sink on the processor. See Figure 3-7.

4   Using a Phillips screwdriver, tighten the four heat-sink retention screws.

5 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

6 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Processors

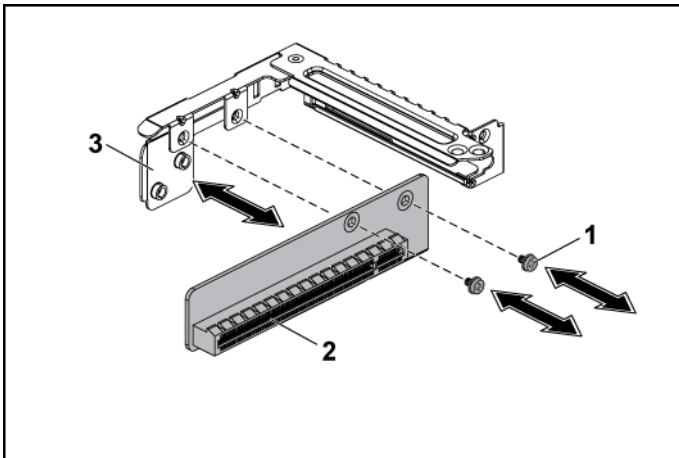## Removing a Processor

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3 Remove the heat sink, see "Removing the Heat Sink" on page 70.

⚠ **CAUTION: The processor is held in its socket under strong pressure. Be aware that the release lever can spring up suddenly if not firmly grasped.**

4 Position your thumb firmly over the processor socket-release lever and release the lever from the locked position. Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-8.

5 Rotate the processor shield upward and out of the way. See Figure 3-8.

6 Lift the processor out of the socket and leave the socket-release lever up so that the socket is ready for the new processor.

⚠ **CAUTION: Be careful not to bend any of the pins on the ZIF socket when removing the processor. Bending the pins can permanently damage the system board.**

Figure 3-8. Removing and Installing a Processor
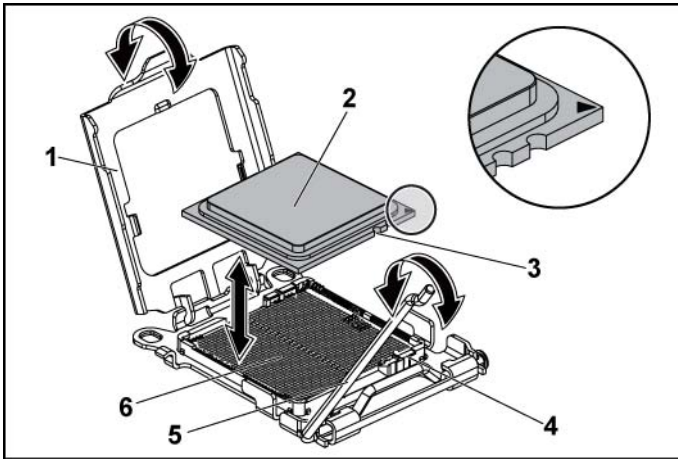
1	processor shield	2	processor
3	notch in processor (2)	4	socket key (2)
5	socket-release lever	6	ZIF socket

Installing a Processor

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

📝 **NOTE:** When installing only one processor, the processor must be installed in the processor0 (for the socket location, see "System Board Connectors" on page 147).

📝 **NOTE:** If you are upgrading your processors, prior to upgrading your system, download and install the latest system BIOS version from **support.dell.com**. Follow the instructions included in the file download to install the update on your system.

1 Unpack the processor if it has not been used previously.
   If the processor has already been used, remove any thermal grease from the top of the processor using a lint-free cloth.

2 Align the processor with the socket keys on the ZIF socket. See Figure 3-8.

⚠ **CAUTION: Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the ZIF socket.**

3 With the release lever on the processor socket in the open position, align the processor with the socket keys and set the processor lightly in the socket. See Figure 3-8.

⚠ **CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.**

4 Close the processor shield.

5 Rotate the socket release lever down until it snaps into place.

6 Using a clean lint-free cloth, remove the thermal grease from the heat sink.

7 Apply thermal grease evenly to the center of the top of the new processor.

⚠ **CAUTION: Using excess thermal grease can cause grease to contact the processor shield, which can cause contamination of the processor socket.**

8 Place the heat sink on the processor. See Figure 3-7.

9 Using a Phillips screwdriver, tighten the heat-sink retention screws. See Figure 3-7.

10 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

11 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

12 Press <F2> to enter the System Setup program, and check that the processor information matches the new system configuration. See "System Setup Options at Boot" on page 31.

Expansion-Card Assembly and Expansion Card
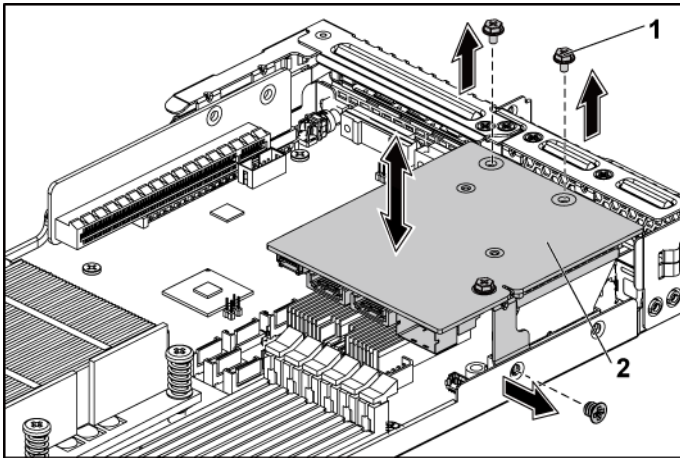
Removing the Expansion Card

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.
3 Remove the four screws that secure the expansion-card assembly. See Figure 3-9.
4 Lift the expansion-card assembly out of the system-board assembly. See Figure 3-9.

Figure 3-9. Removing the Expansion-Card Assembly
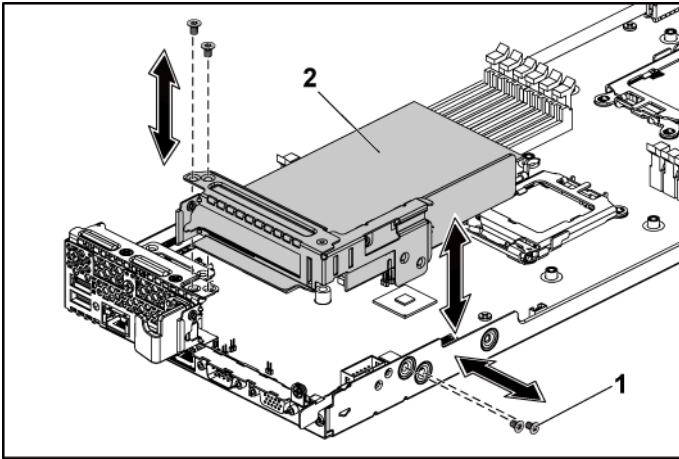
| 1 | screw (4) | 2 | expansion-card assembly |

5 Remove the screw securing the expansion card.

Figure 3-10. Removing the Expansion Card
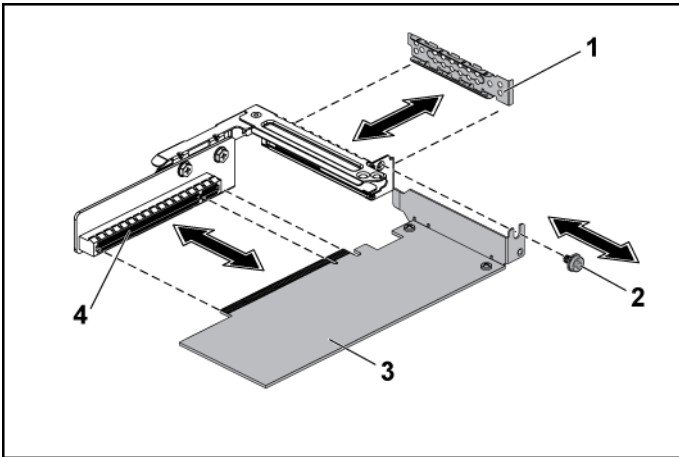
| 1 | expansion-card slot cover | 2 | screw |
| 3 | expansion card | 4 | expansion-card connector |

6 Grasp the expansion card by its edges, and carefully remove it from the expansion-card connector.

7 If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening, and close the expansion-card latch.

> **NOTE:** You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

Installing the Expansion Card

> **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

> **CAUTION: Expansion cards can only be installed in the slots on the expansion-card riser. Do not attempt to install expansion cards directly into the riser connector on the system board.**

1 Unpack the expansion card and prepare it for installation. For instructions, see the documentation accompanying the card.

2 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

3 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

4 Remove the four screws that secure the expansion-card assembly.

5 Lift the expansion-card assembly away from the system-board assembly.

6 Remove the screw securing the filler bracket.

7   Grasp the filler bracket by its edges, and carefully remove it from the expansion-card connector.

> **NOTE:** Keep this bracket in case you need to remove the expansion card. Filler brackets must be installed over empty expansion-cards slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

8   Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion-card connector on the expansion-card assembly.

9   Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.

10 Replace the screw securing the expansion card.

11 Place the expansion-card assembly into the system-board assembly.

12 Replace the four screws that secure the expansion-card assembly.

13 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

14 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Expansion-Card Connector

Removing the Expansion-Card Connector

> **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3 Remove the expansion card. See "Removing the Expansion Card" on page 75.

4 Remove the two screws securing the expansion-card connector to the expansion-card bracket. See Figure 3-11.

5 Pull the expansion-card connector away from the expansion-card racket. See Figure 3-11.

Figure 3-11. Removing and Installing the Expansion-Card Connector

| 1 | screw (2) | 2 | expansion-card connector |
| 3 | expansion-card bracket | | |

Installing the Expansion-Card Connector

△ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Place the expansion-card connector into the expansion-card bracket. See Figure 3-11.
2 Replace the two screws securing the expansion-card connector to the expansion-card bracket. See Figure 3-11.
3 Install the expansion card. See "Installing the Expansion Card" on page 77.
4 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.
5 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Daughter Card

Removing the SAS Daughter Card

△ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3 Disconnect all the cables from the daughter card.

4 Remove the three screws that secure the daughter card. See Figure 3-12.

5 Lift the daughter card out of the system-board assembly. See Figure 3-12.

Figure 3-12. Removing and Installing the SAS Daughter Card

| 1 | screw (3) | 2 | daughter card |

Installing the SAS Daughter Card

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Place the daughter card on the system-board assembly. See Figure 3-12 and Figure 5-10.

2 Replace the three screws that secure the daughter card. See Figure 3-12.

3 Reconnect all the cables to the daughter card.

4 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

5 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

System Memory

Each system board has twelve unbuffered or registered DDR3-DIMM slots for the installation of up to twelve DDR3-800/1066/1333 memory chips to support processor 0 and processor 1. See "System Board Connectors" on page 147 for the location of the memory modules.

Supported DIMM Configuration

For the sequence of the twelve DIMM sockets, see Figure 3-13. When you insert the SR/DR DIMM(s), always start with DIMMA2. See Table 3-2 for possible memory configurations.

Figure 3-13. Memory Slot Locations
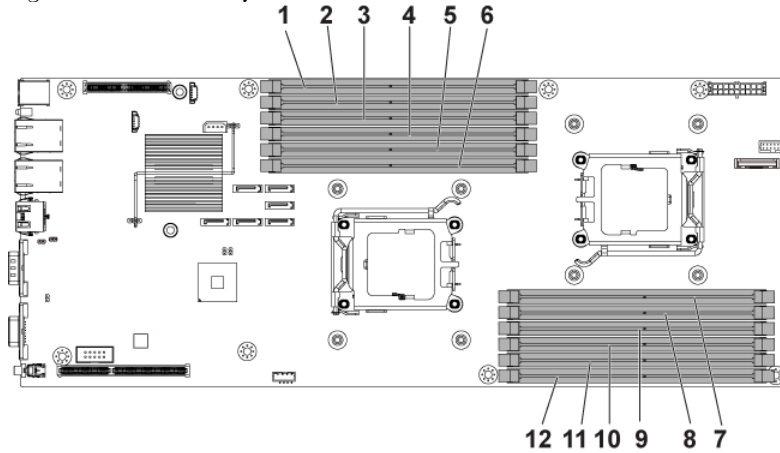
1	DIMM_C2	2	DIMM_C1
3	DIMM_C0	4	DIMM_D2
5	DIMM_D1	6	DIMM_D0
7	DIMM_B0	8	DIMM_B1
9	DIMM_B2	10	DIMM_A0
11	DIMM_A1	12	DIMM_A2

Table 3-2. Memory Module Configurations

		Processor 0					
	DIMM	DIMM B0	DIMM B1	DIMM B2	DIMM A0	DIMM A1	DIMM A2
SR/DR	1	–	–	–	–	–	√
	2	–	–	√	–	–	√
	2	–	–	–	–	–	√
	4	√	–	√	√	–	√
	4	–	–	√	–	–	√
	6	√	√	√	√	√	√
	8	√		√	√		√
	12	√	√	√	√	√	√
QR	4	–	√	–	–	√	–

	DIMM	Processor 1					
		DIMM D0	DIMM D1	DIMM D2	DIMM C0	DIMM C1	DIMM C2
SR/DR	1	–	–	–	–	–	–
	2	–	–	–	–	–	–
	2	–	–	–	–	–	√
	4	–	–	–	–	–	–
	4	–	–	√	–	–	√
	6	–	–	–	–	–	–
	8	√	–	√	√	–	√
	12	√	√	√	√	√	√
QR	4	–	√	–	–	√	–

NOTE: An empty DIMM socket is marked as "–". For best performance, all the memory modules installed must be of the same speed, capacity, and from the same manufacturer. SR is Single Rank, DR is Dual Rank and QR is Quad Rank.

Removing the Memory Modules

WARNING: The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.
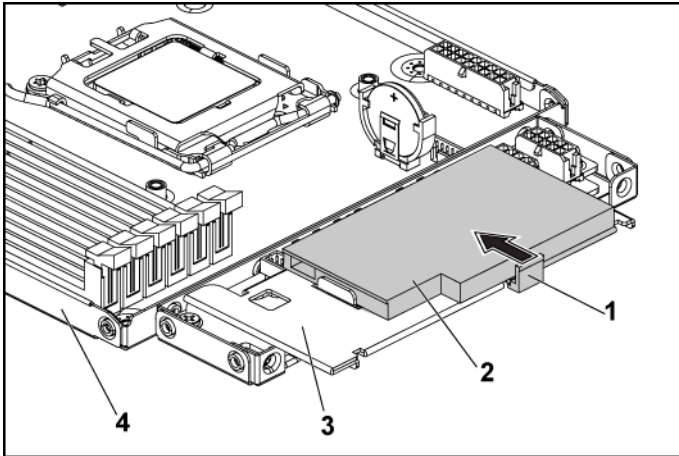
1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.
3 Locate the memory module sockets. See Figure 3-13.

4   Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 3-14.

5   Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

6   Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

7   Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.

Installing the Memory Modules

⚠ **WARNING: The memory modules are hot to the touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.**

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2   Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3   Locate the memory module sockets. See Figure 3-13.

4   Press the ejectors on the memory module socket down and out, as shown in Figure 3-14, to allow the memory module to be inserted into the socket.

5   Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

6 Align the memory module's edge connector with the alignment key of the memory module socket, and insert the memory module in the socket. See Figure 3-14.

📝 **NOTE:** The memory module socket has an alignment key that allows you to install the memory module in the socket in only one way.

Figure 3-14.   Installing and Removing a DIMM
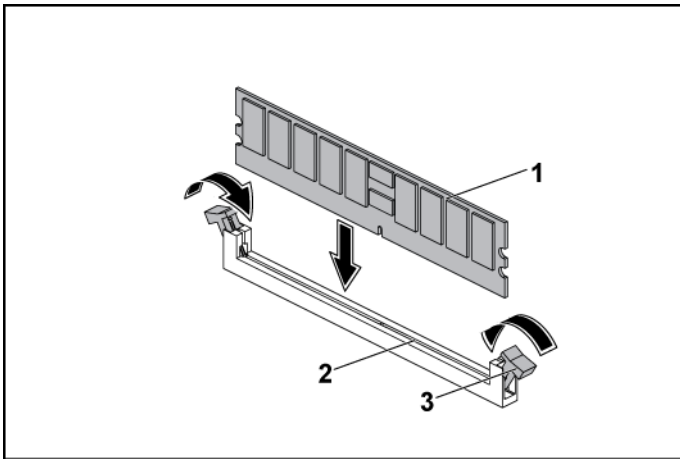
1	memory module	2	memory module socket
3	memory module socket ejector (2)		

7 Press down on the memory module with your thumbs to lock the memory module into the socket. See Figure 3-14.
When the memory module is properly seated in the socket, the ejectors on the memory module socket align with the ejectors on the other sockets that have memory modules installed.

8 Repeat step 4 through step 7 of this procedure to install the remaining memory modules in the approved configurations. See Table 3-2.

9 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

10 Start up the system, press <F2> to enter the System Setup program, and check the System Memory settings on the main System Setup screen.
The system should have already changed the value to reflect the newly installed memory.

11 If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 2 through step 10 of this procedure, to ensure that the memory modules are firmly seated in their sockets.

Interposer Extenders

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Removing the Interposer Extender

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.
3 Remove the five screws that secure the interposer extender to the interposer-extender tray. See Figure 3-15.
4 Disconnect all the cables from the interposer extender. See Figure 5-9.
5 Lift the interposer extender out of the interposer-extender tray. See Figure 3-15.

Figure 3-15.   Removing and Installing the Interposer Extender

1	screw (5)	2	interposer-extender tray
3	interposer extender		

Installing the Interposer Extender

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Place the interposer extender into the interposer-extender tray.
2 Replace the five screws that secure the interposer extender to the interposer-extender tray.
3 Connect all the cables to the interposer extender. See Figure 5-9.
4 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

5 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

System Battery

Replacing the System Battery

⚠️ **WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. See your safety information for additional information.**

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

Figure 3-16.   Replacing the System Battery
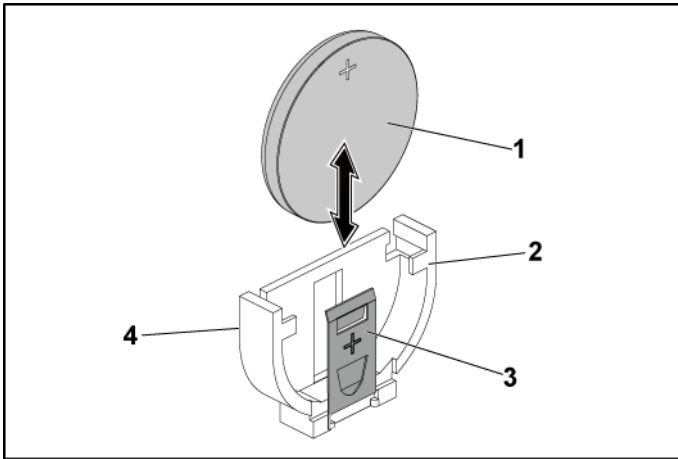
1	system battery	2	positive side of battery connector
3	retention clip	4	negative side of battery connector

3   Locate the battery location. See "System Board Connectors" on page 147.

⚠ **CAUTION: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.**

4   Gently pull the retention clip over the battery towards the positive side of the connector and lift the battery out of the connector. See Figure 3-16.

5   Hold the new battery with the "+" facing the retention clip on the battery connector. See Figure 3-16.

6   Gently pull the retention clip towards the positive side of the connector and slide the battery into the connector until the retention clip snaps into place. See Figure 3-16.

7   Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

8   Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.

9   Enter the System Setup program to confirm that the battery is operating properly. See "Using the System Setup Program" on page 30.

10 Enter the correct time and date in the System Setup program's **Time** and **Date** fields.

11 Exit the System Setup program.

RAID Battery (Optional)

Removing the RAID Battery

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

✐ **NOTE:** The information in this section applies only to systems with the optional RAID controller card.

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3   To disconnect the RAID battery cable from the connector on the PERC card, press the tab on the RAID battery cable connector, and gently pull the cable connector out of the connector on the PERC card.

4   Press the RAID battery latch and lift the RAID battery to release it from the RAID battery carrier. See Figure 3-17.

5 Slide and lift the RAID battery away from the RAID battery carrier. See Figure 3-17.

Figure 3-17. Removing and Installing the RAID Battery

1	RAID battery latch	2	RAID battery
3	RAID battery carrier	4	system-board assembly

Installing the RAID Battery

1 Insert the RAID battery into the battery carrier until the RAID battery latch locks into place. See Figure 3-17.

2 Connect the RAID battery cable to the connector on the PERC card.

3 Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

4 Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.

Removing the RAID Battery Carrier

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

📝 **NOTE:** The information in this section applies only to systems with the optional RAID controller card.

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2   Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.
3   Remove the RAID battery. See "Removing the RAID Battery" on page 91.
4   Remove the three screws securing the RAID battery carrier to the interposer extender. See Figure 3-18.
5   Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.
6   Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.

Figure 3-18.   Removing and Installing the RAID Battery Carrier
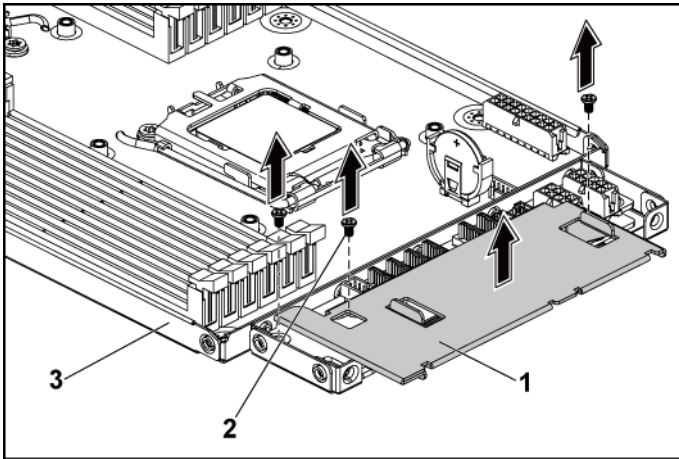
| 1 | RAID battery carrier | 2 | screw (3) |
| 3 | system-board assembly | | |

Installing the RAID Battery Carrier

1   Place the RAID battery carrier in position on the interposer extender. See Figure 3-18.

2   Replace the screws securing the RAID battery carrier to the interposer extender. See Figure 3-18.

3   Install the RAID battery into the RAID battery carrier. See "Installing the RAID Battery" on page 92.

4   Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

5   Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.

System Board

Removing a System Board

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3 Remove the heat sink. See "Removing the Heat Sink" on page 70.

4 Remove the expansion-card assembly. See "Removing the Expansion Card" on page 75.

5 If installed, remove the SAS daughter card. See "Removing the SAS Daughter Card" on page 80.

6 Disconnect the hard drive and power cables from the system board.

7 Remove the eight screws and then slide the system board. See Figure 3-19.

⚠ CAUTION: Do not lift the system board by grasping a memory module, processor, or other components.

8 Grasp the system board by the edges and lift the system board away from the system-board assembly. See Figure 3-19.

Figure 3-19. Removing and Installing the System Board
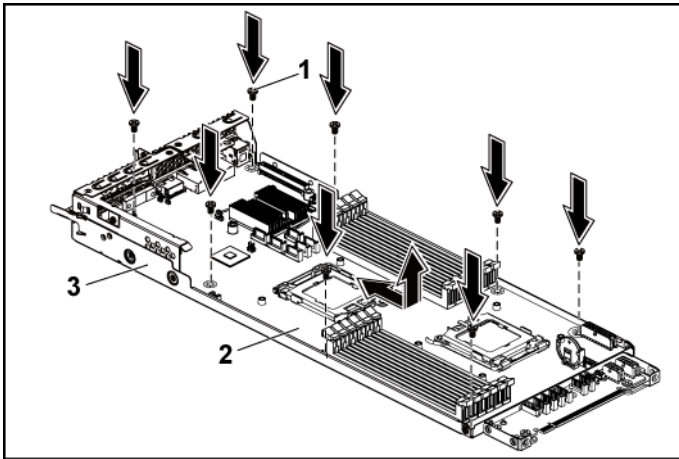
1	screw (8)	2	system board
3	system-board assembly		

Installing a System Board

1   Unpack the new system board.

2   Holding the system board by the edges, slide the system board into the
    system-board assembly.

3   Replace the eight screws to secure the system board to the system-
    board assembly.

4   Transfer the processors to the new system board. See "Removing a
    Processor" on page 72 and "Installing a Processor" on page 73.

5   Remove the memory modules and transfer them to the same locations
    on the new board. See "Interposer Extenders" on page 87 and
    "Installing the Memory Modules" on page 85.

6   Connect the hard drive and power cables to the system board.

7   If applicable, install the SAS daughter card. See "Installing the SAS Daughter Card" on page 81.

8   Install the expansion-card assembly. See "Installing the Expansion Card" on page 77.

9   Replace the system-board assembly. See "Installing a System-Board Assembly" on page 69.

10   Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Opening and Closing the System

⚠️   **WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.**

⚠️   **CAUTION: This system must be operated with the system cover installed to ensure proper cooling.**

⚠️   **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Opening the System

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Remove the securing screw from the system cover. See Figure 3-20.

3   Press the cover release latch lock. See Figure 3-20.

4   Grasp cover on both the sides with your palm on the traction pad, slide out and lift the cover away from the system. See Figure 3-20.

Figure 3-20.   Opening and Closing the System
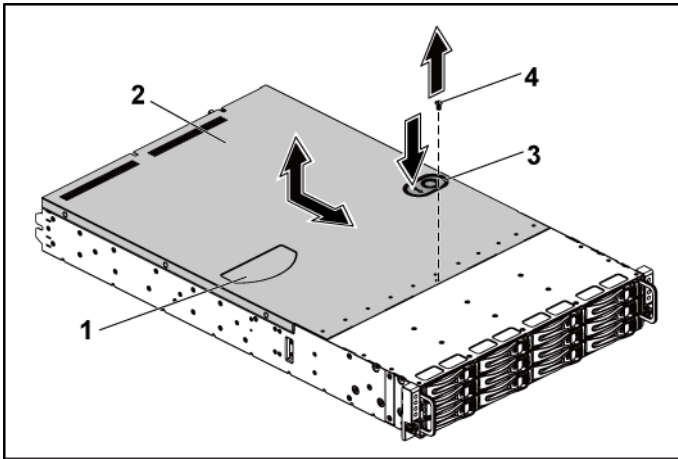
| 1 | traction pad | 2 | system cover |
| 3 | cover release latch lock | 4 | securing screw |

Closing the System

1   Place the cover on the chassis and slide it to the front of the chassis until it snaps into place. See Figure 3-20.

2   Secure the cover with the securing screw. See Figure 3-20.

Cooling Fans

Removing a Cooling Fan

⚠ WARNING: Do not attempt to operate the system without the cooling fans.

⚠ WARNING: The cooling fan can continue to spin for some time after the system has been powered down. Allow time for the fan to stop spinning before removing it from the system.

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 97.

3 Disconnect the fan's power cable from the fan-controller board. Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

4 Lift the fan out of the cooling-fan cage.

Figure 3-21. Removing and Installing a Cooling Fan
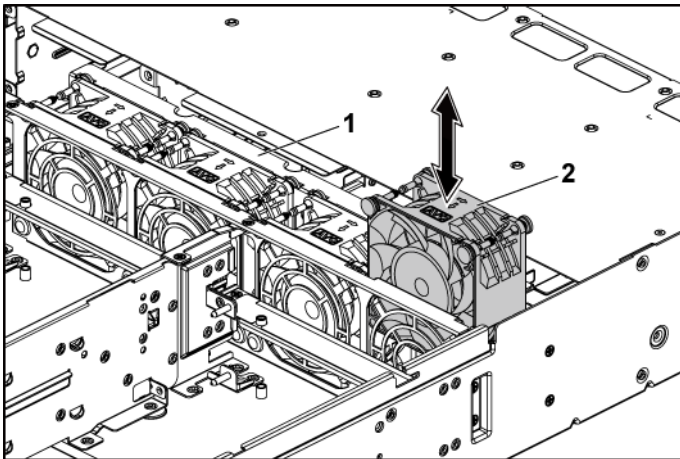
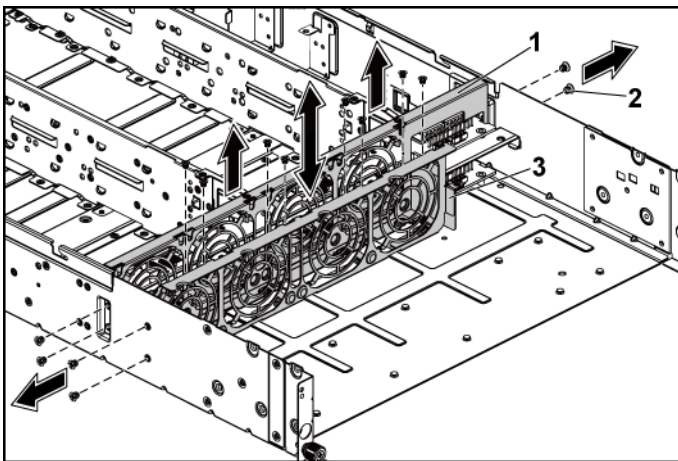| 1 | cooling-fan cage | 2 | cooling fans (4) |

Installing a Cooling Fan

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Align the cooling fan and slide it in the cooling-fan cage until the cooling fan is firmly seated. See Figure 3-21.

> **NOTE:** The fan blades should face the front panel of the system.

2   Connect the fan's power cable to the connector on the fan-controller board.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

3   Close the system. See "Closing the System" on page 98.

4   Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Power Distribution Boards

Removing a Power Distribution Board

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

> **NOTE:** This system has two power distribution boards. The procedure to remove and install both the power distribution boards is similar. To access the second power distribution board at the bottom, remove the power distribution board at the top.

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 97.

3 Remove the power supply. See "Removing and Installing a Power Supply" on page 67.

4 Disconnect all the cables from the first power distribution board. See Figure 5-12.
Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

5 Remove the screws securing the first power distribution board to the system. See Figure 3-22.

6 Lift the power distribution board out of the system. See Figure 3-22.

> **NOTE:** To remove the second power distribution board that is below the first power distribution board, remove the power distribution board connector and angle the board before lifting.

Figure 3-22.   Removing and Installing a Power Distribution Board
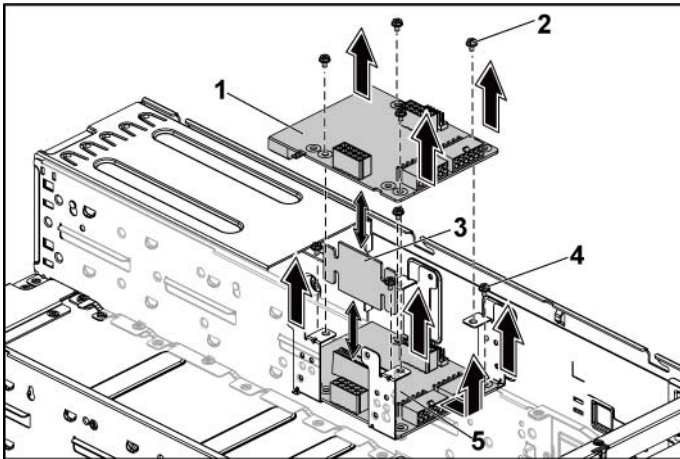
1	1st power distribution board	2	screw (4)
3	power distribution board-connector	4	screw (4)
5	2nd power distribution board		

Installing a Power Distribution Board

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠ **CAUTION: If removed, you must replace the second power distribution board at the bottom and the power distribution board-connector before replacing the first power distribution board at the top.**

1   If removed, first place the second power distribution board in the system. See Figure 3-22. Otherwise skip to step 5.

NOTE: To install the second power distribution board that is below the first power distribution board, angle the board during installation.

2   Replace the screws securing the second power distribution board to the system. See Figure 3-22.

3   Replace the power distribution board-connector. See Figure 3-22.

4   Connect all the cables to the second power distribution board. See Figure 5-12.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

5   Replace the screws securing the first power distribution board to the system. See Figure 3-22.

6   Connect all the cables to the first power distribution board. See Figure 5-12.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

7   Replace the power supply. See "Installing a Power Supply" on page 67.

8   Close the system. See "Closing the System" on page 98.

9   Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Fan Controller Board

Removing the Fan Controller Board

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 97.

3 Remove the power distribution boards. See "Removing a Power Distribution Board" on page 100.

4 Disconnect all the cables from the fan controller board. See Figure 5-11. Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

5 Remove the screw securing the fan controller board to the chassis. See Figure 3-23.

6 Slide and lift the fan controller board out of the chassis. See Figure 3-23.

Figure 3-23.   Removing and Installing the Fan Controller Board
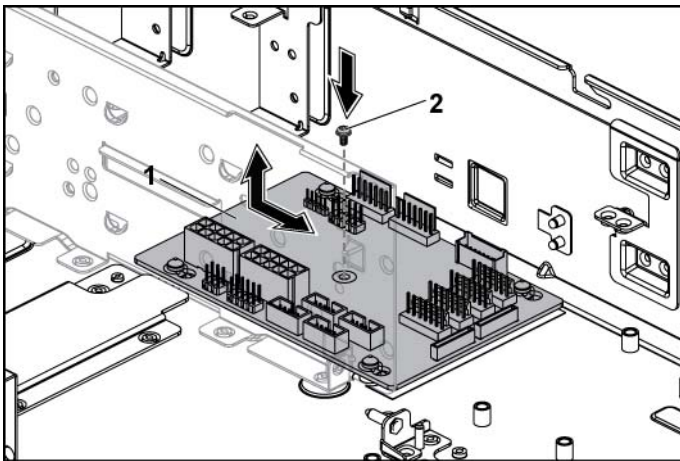
| 1 | fan controller board | 2 | screw |

Installing the Fan Controller Board

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Place the fan controller board into the chassis and slide it into place. See Figure 3-23.
2 Replace the screw to secure the fan controller board to the chassis. See Figure 3-23.
3 Connect all the cables to the fan controller board. See Figure 5-11. You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
4 Replace the power distribution boards. See "Installing a Power Distribution Board" on page 102.
5 Close the system. See "Closing the System" on page 98.
6 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Middle Planes

Removing the Middle Planes

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 97.

3 Remove the system-board assemblies. See "Removing a System-Board Assembly" on page 68.

4 Remove the cooling fans. See "Removing a Cooling Fan" on page 98.

5 Remove the screws that secure the cooling-fan brackets to the chassis. See Figure 3-24.

6 Lift the cooling-fan brackets out of the chassis. See Figure 3-24.

Figure 3-24. Removing and Installing the Cooling-Fan Brackets

1	cooling fan bracket (long)	2	Screw (14)
3	cooling fan bracket (short)		

7 Remove the screws that secure the upper middle plane to the middle plane holder. Figure 3-25.

8 Disconnect all the cables from the upper middle plane. See Figure 5-9. Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

9   Lift the upper middle plane out. See Figure 3-25.

Figure 3-25.   Removing and Installing the Upper Middle Plane
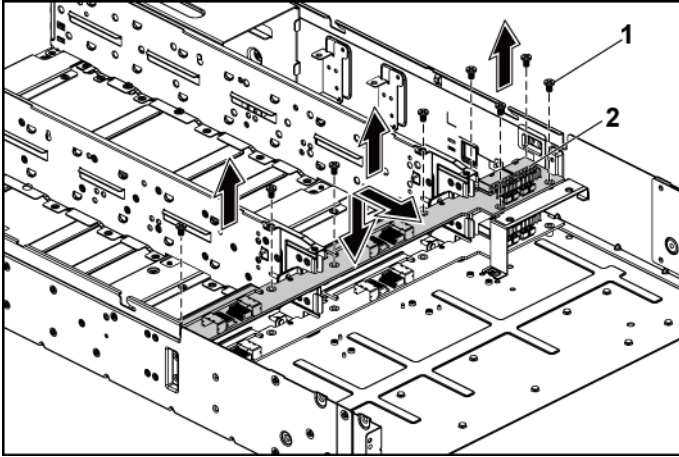
1	screw (9)	2	upper middle plane

10 Remove the screws that secure the mid-plane holder support to the chassis. See Figure 3-26.

11 Lift the mid-plane holder support out of the chassis. Figure 3-26.

Figure 3-26. Removing and Installing the Mid-plane Holder Support
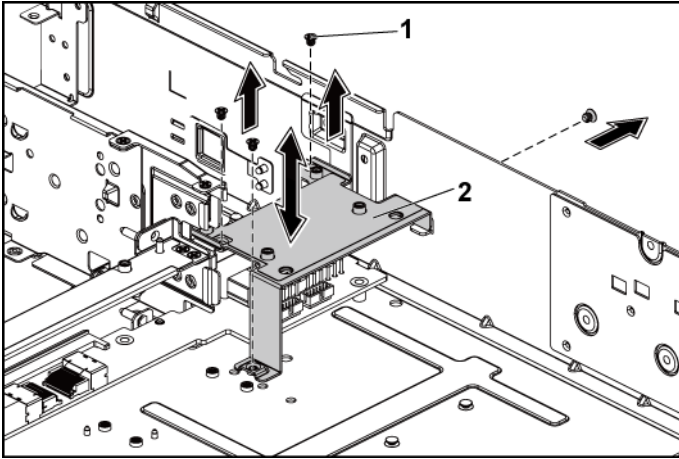
1	screw (4)	2	mid-plane holder support

12 Remove the screws that secure the mid-plane holder to the chassis. Figure 3-27.

13 Lift the mid-plane holder out of the chassis. See Figure 3-27.

Figure 3-27.   Removing and Installing the Mid-plane Holder
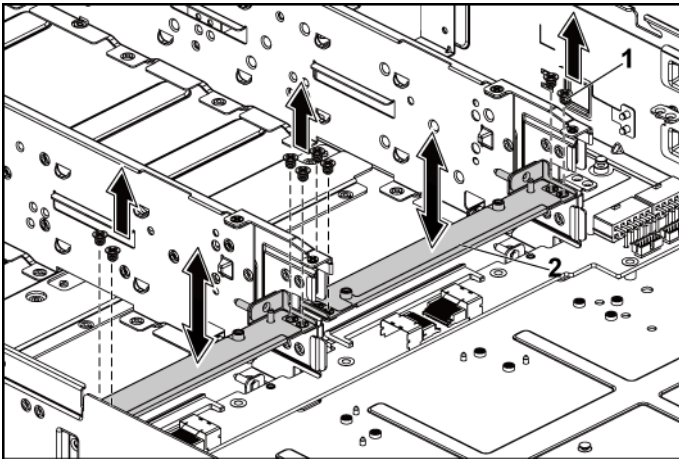
| 1 | screw (8) | 2 | mid-plane holder |

14 Remove the screws that secure the lower middle plane to the chassis. Figure 3-28.

15 Disconnect all the cables from the lower middle plane. See Figure 5-9. Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

16 Lift the lower middle plane out of the chassis. See Figure 3-28.

Figure 3-28. Removing and Installing the Lower Middle Plane
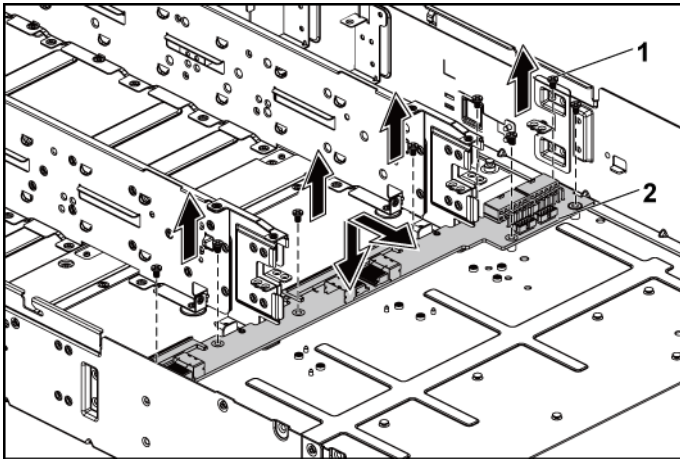
| 1 | screw (8) | 2 | lower middle plane |

Installing the Middle Planes

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Place the lower middle plane into the chassis. See Figure 3-28.

2 Replace the screws that secure the lower middle plane to the chassis. See Figure 3-28.

3 Connect all the cables to the lower middle plane. See Figure 5-9. You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

4 Place the middle plane holder into the chassis. See Figure 3-27.

5   Replace the screws that secure the middle plane holder to the chassis. See Figure 3-27.

6   Place the mid-plane holder support into the chassis. See Figure 3-26.

7   Replace the screws that secure the mid-plane holder support to the chassis. See Figure 3-26.

8   Place the upper middle plane on the middle plane holder. See Figure 3-25.

9   Replace the screws that secure the middle plane to the middle plane holder. Figure 3-25.

10 Connect all the cables to the upper middle plane. See Figure 5-9.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

11 Place the fan bracket into the chassis. Figure 3-24.

12 Replace the screws that secure the fan bracket to the chassis. Figure 3-24.

13 Replace the cooling fans. See "Installing a Cooling Fan" on page 100.

14 Replace the system-board assemblies. See "Installing a System-Board Assembly" on page 69.

15 Close the system, see "Closing the System" on page 98.

16 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Backplanes

NOTE: Following is the replacement procedure of SATA2 and SAS backplane for 3.5-inch hard drive systems. Replacement procedure for 2.5-inch of SATA2 and SAS backplane is similar to backplane for 3.5-inch hard drive systems.

Removing the Backplane

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 61.

3 Open the system. See "Opening the System" on page 97.

⚠️ **CAUTION: To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.**

⚠️ **CAUTION: You must note the number of each hard drive and temporarily label them before removal so that you can replace them in the same locations.**

4 Remove the screws that secure the hard-drive cage to the chassis. See Figure 3-29.

Figure 3-29. Removing and Installing the Backplane
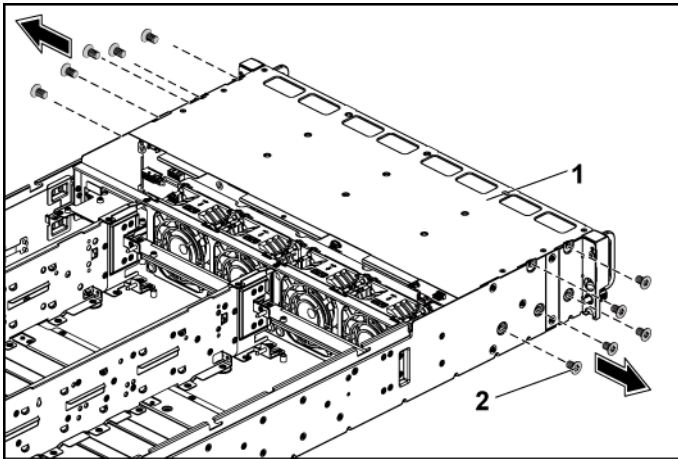
1	hard-drive cage	2	screw (10)

5 Remove the screws that secure the front-panel assemblies to the chassis. See Figure 3-30.

6 Disconnect all the cables from the backplane. See Figure 5-3 for 3.5-inch hard drives and Figure 5-5 for 2.5-inch hard drives.
Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

7 Disconnect front panel cables from the fan controller board. See Figure 5-11.
Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

8 Remove the hard-drive cage from the chassis. See Figure 3-30.

Figure 3-30. Removing and Installing the Hard-Drive Cage
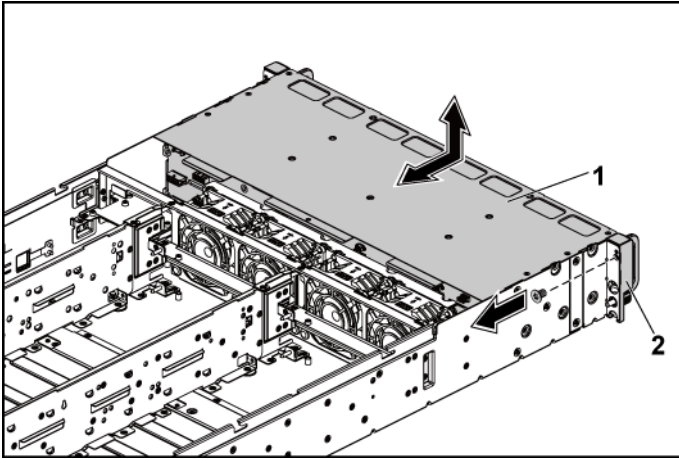
1	hard-drive cage	2	front-panel assembly (2)

9 Remove the screws that secure the backplane to the hard-drive cage. See Figure 3-31.

10 Remove the backplane from the hard-drive cage. See Figure 3-31.

Figure 3-31.   Removing and Installing the Backplane From the Hard-Drive Cage
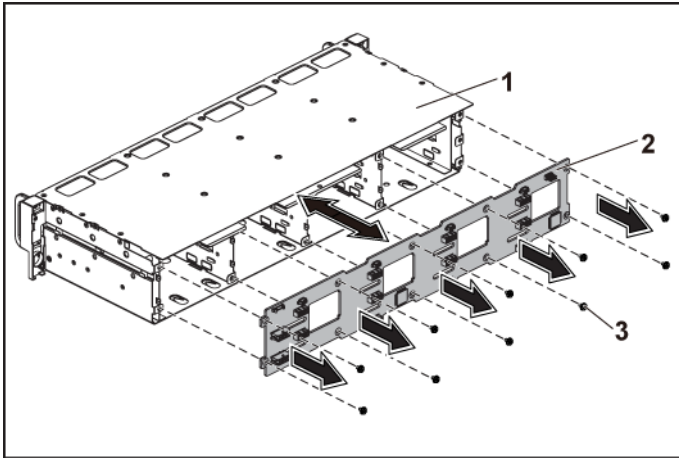
1	hard-drive cage	2	backplane
3	screw (10)		

Installing the Backplane

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Install the backplane into the hard-drive cage. See Figure 3-31.

2   Replace the screws that secure the backplane to the hard-drive cage. See Figure 3-31.

3   Replace the hard-drive cage into the chassis. See Figure 3-30.

4   Replace the screws that secure the front-panel assemblies to the chassis. See Figure 3-30.

5   Connect all the cables to the backplane. See Figure 5-3 for 3.5-inch hard drives and Figure 5-5 for 2.5-inch hard drives.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
6   Connect front panel cables to the fan controller board. See Figure 5-11.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
7   Replace the screws that secure the hard-drive cage. See Figure 3-29.
8   Close the system, see "Closing the System" on page 98.
9   Replace the hard drives. See "Installing a Hard Drive into a Hard-Drive Carrier" on page 64.
10 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Expander Card (Optional)

NOTE: The information in this section applies only to two system-board systems with the 2.5-inch of SATA2 and SAS backplane.

Removing the Expander Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1   Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2   Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 61.
3   Open the system. See "Opening the System" on page 97.

⚠ **CAUTION: To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.**

⚠ **CAUTION: You must note the number of each hard drive and temporarily label them before removal so that you can replace them in the same locations.**

4 Remove the screws that secure the hard-drive cage to the chassis. See Figure 3-32.

Figure 3-32.   Removing and Installing the 2.5-inch Hard-Drive Backplane
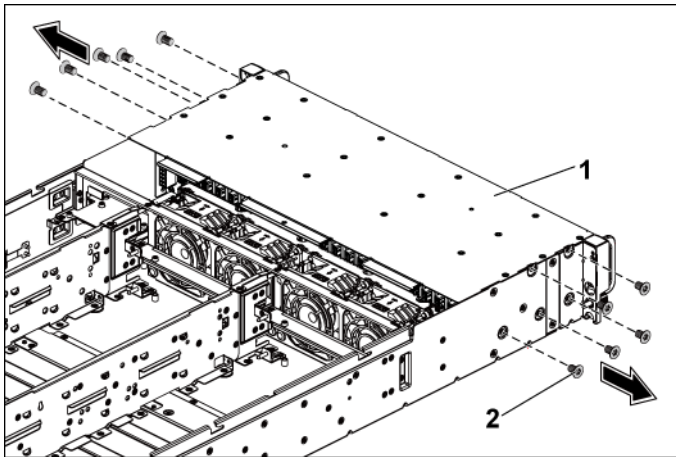
| 1 | hard-drive cage | 2 | screw (10) |

5 Remove the screws that secure the front-panel assemblies to the chassis. See Figure 3-32.

6 Disconnect all the cables from the backplane. See Figure 5-6 for 2.5-inch hard drives.
  Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

7   Disconnect all the cables from the expander card. See Figure 5-7.
    Note the routing of the cable underneath the tabs on the chassis as you
    remove them from the system. You must route these cables properly
    when you replace them to prevent the cables from being pinched or
    crimped.

8   Disconnect front panel cables from the fan controller board. See Figure
    5-11.
    Note the routing of the cable underneath the tabs on the chassis as you
    remove them from the system. You must route these cables properly
    when you replace them to prevent the cables from being pinched or
    crimped.

9   Remove the hard-drive cage from the chassis. See Figure 3-33.

Figure 3-33.   Removing and Installing the Hard-Drive Cage
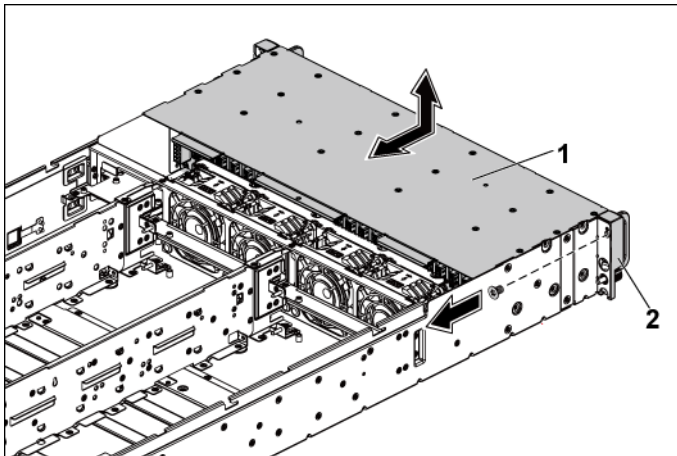
| 1 | hard-drive cage | 2 | front-panel assembly (2) |

10 Remove the screws that secure the backplane to the hard-drive cage.
    See Figure 3-34.

11 Remove the backplane with the expander card from the hard-drive cage. See Figure 3-34.

Figure 3-34. Removing and Installing the Backplane with the Expander Card From the Hard-Drive Cage
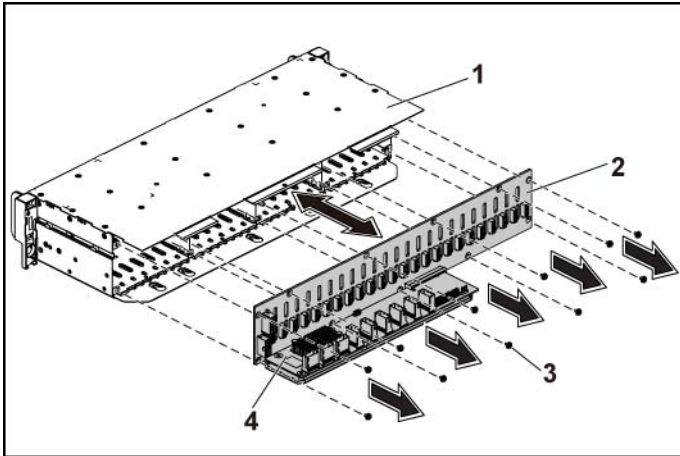
| 1 | hard-drive cage | 2 | 2.5-inch hard-drive backplane |
| 3 | screw (10) | 4 | expander card |

12 Remove the expander card from the 2.5-inch hard-drive backplane. See Figure 3-35.

Figure 3-35. Removing and Installing the Expander Card From the Backplane
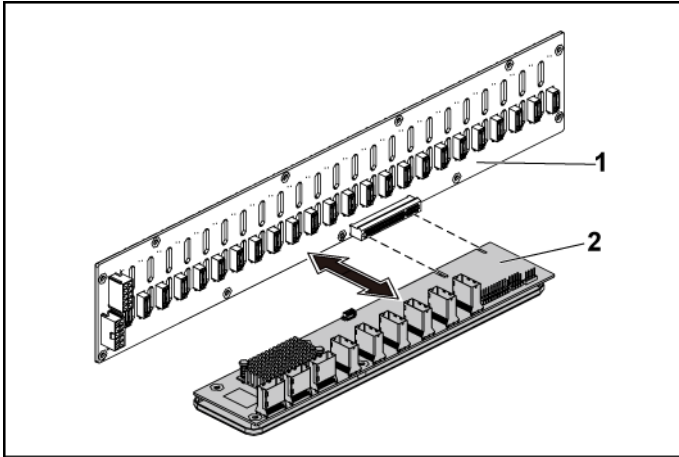
| 1 | 2.5-inch hard-drive backplane | 2 | expander card |

Installing the Expander Card

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Install the expander card into the 2.5-inch hard-drive backplane. See Figure 3-35.

2   Install the 2.5-inch hard-drive backplane into the hard-drive cage. See Figure 3-34.

3   Replace the screws that secure the backplane to the hard-drive cage. See Figure 3-34.

4   Replace the hard-drive cage into the chassis. See Figure 3-33.

5   Replace the screws that secure the front-panel assemblies to the chassis. See Figure 3-33.

6   Connect all the cables to the backplane. See Figure 5-5 for 2.5-inch hard drives.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

7   Connect all the cables to the expander card. See Figure 5-7.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

8   Connect front panel cables to the fan controller board. See Figure 5-11.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

9   Replace the screws that secure the hard-drive cage. See Figure 3-32.

10 Close the system, see "Closing the System" on page 98.

11 Replace the hard drives. See "Installing a Hard Drive into a Hard-Drive Carrier" on page 64.

12 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Front Panels

Removing the Front Panel

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 61.

3   Open the system. See "Opening the System" on page 97.

4   Disconnect all the cables from the backplane. See Figure 5-3 for 3.5-inch hard drives and Figure 5-6 for 2.5-inch hard drives.
    Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

5   Disconnect front panel cables from the fan controller board. See Figure 5-11.
    Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

6   Remove the screws that secure the hard-drive cage to the chassis. See Figure 3-29.

7   Remove the screws that secure the front-panel assemblies to the chassis. See Figure 3-30.

8   Remove the hard-drive cage from the chassis. See Figure 3-30.

9   Remove the screws that secure the front-panel assembly to the hard-drive cage. See Figure 3-36.

10 Remove the front-panel assembly from the hard-drive cage. See Figure 3-36.

Figure 3-36.   Removing and Installing a Front Panel Assembly
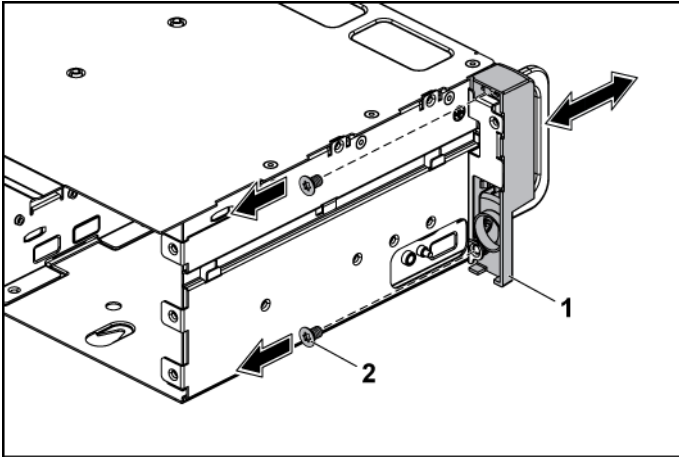
1	front-panel assembly	2	screw (2)

11 Push aside the retention hooks on the front-panel assembly. See Figure 3-37.

12 Remove the front panel from the front-panel assembly. See Figure 3-37.

Figure 3-37. Removing and Installing a Front Panel
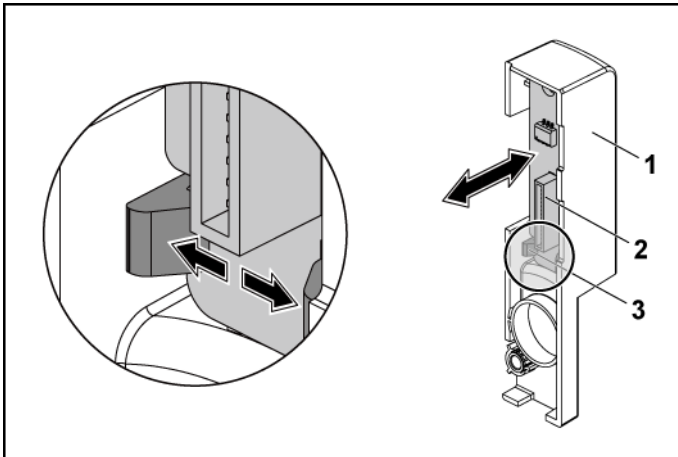
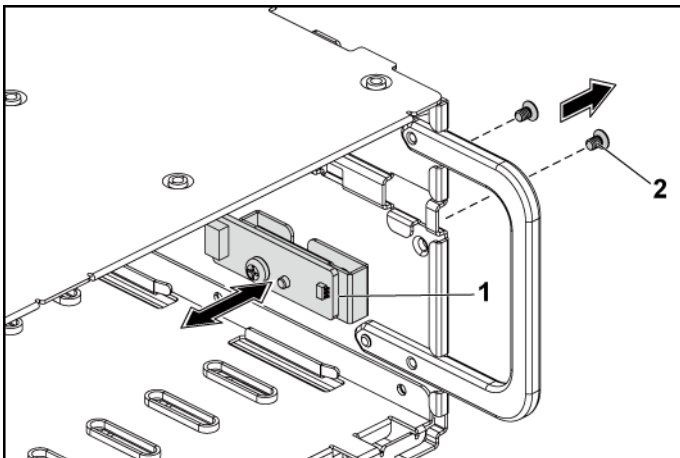|			
1	front-panel assembly	2	front panel
3	retention hooks		

Installing the Front Panel

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Push aside the retention hooks on the front-panel assembly and place the front panel into the front-panel assembly. See Figure 3-37.

2 Replace the front-panel assembly into the hard-drive cage. See Figure 3-36.

3 Replace the screws that secure the front-panel assembly to the hard-drive cage. See Figure 3-36.

4 Replace the hard-drive cage into the chassis. See Figure 3-30.

5   Replace the screws that secure the front-panel assemblies to the chassis. See Figure 3-30.

6   Replace the screws that secure the hard-drive cage to the chassis. See Figure 3-29.

7   Connect front panel cables to the fan controller board. See Figure 5-11. You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

8   Connect all the cables to the backplane. See Figure 5-3 for 3.5-inch hard drives and Figure 5-6 for 2.5-inch hard drives.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.

9   Close the system. See "Closing the System" on page 98.

10 Replace the hard drives. See "Installing a Hard Drive into a Hard-Drive Carrier" on page 64.

11 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Sensor Boards

Removing the Sensor Board for 3.5" HDD System

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1   Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2   Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 61.

3   Open the system. See "Opening the System" on page 97.

4 Disconnect all the cables from the backplane. See Figure 5-3 for 3.5-inch hard drives.

Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

5 Disconnect front panel cables from the fan controller board. See Figure 5-11.

Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

6 Remove the hard drive cage from the chassis. See Figure 3-30.

7 Disconnect the cable from the sensor board. See Figure 5-13.

8 Remove the screw that secure the sensor board to the hard drive cage. See Figure 3-38.

9 Remove the sensor board from the hard drive cage. See Figure 3-38.

Figure 3-38.   Removing and Installing the Sensor Board
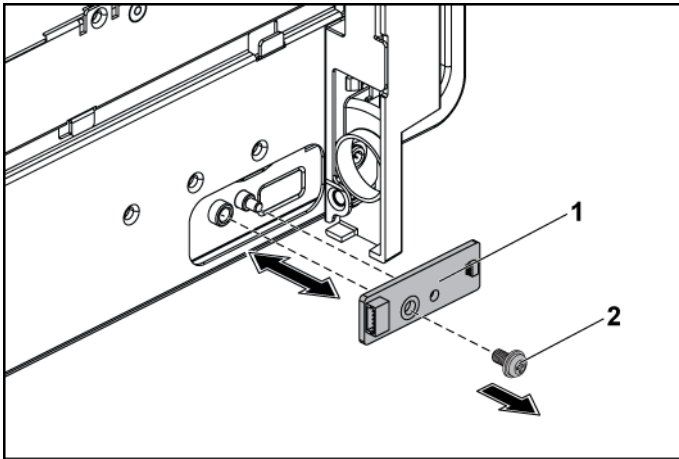
| 1 | sensor board | 2 | screw |

Installing the Sensor Board for 3.5″ HDD System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Replace the sensor board into the hard drive cage. See Figure 3-38.
2 Replace the screw that secure the sensor board to the hard drive cage. See Figure 3-32.
3 Connect the sensor board cable to the sensor board. See Figure 5-13.
4 Replace the hard drive cage into the chassis. See Figure 3-30.
5 Replace the screws that secure the hard-drive cage to the chassis. See Figure 3-29.

6 Connect all the cables to the backplane. See Figure 5-3 for 3.5-inch hard drives.
   You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
7 Connect front panel cables to the fan controller board. See Figure 5-11.
   You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
8 Close the system. See "Closing the System" on page 98.
9 Replace the hard drives. See "Installing a Hard Drive into a Hard-Drive Carrier" on page 64.
10 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Removing the Sensor Board for 2.5″ HDD System

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2 Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 61.
3 Open the system. See "Opening the System" on page 97.
4 Disconnect all the cables from the backplane. See Figure 5-6 for 2.5-inch hard drives.
   Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

5 Disconnect front panel cables from the fan controller board. See Figure 5-11.

Note the routing of the cable underneath the tabs on the chassis as you remove them from the system. You must route these cables properly when you replace them to prevent the cables from being pinched or crimped.

6 Remove the hard drive cage from the chassis. See Figure 3-30.

7 Disconnect the cable from the sensor board assembly. See Figure 5-13.

8 Remove the screw that secure the sensor board assembly to the hard drive cage. See Figure 3-39.

9 Remove the sensor board assembly from the hard drive cage. See Figure 3-39.

Figure 3-39. Removing and Installing the Sensor Board Assembly

1	sensor board assembly	2	screw (2)

10 Remove the screw that secures the sensor board to the sensor-board holder. See Figure 3-40.

11 Remove the sensor board from the sensor-board holder. See Figure 3-40.

Figure 3-40.   Removing and Installing the Sensor Board
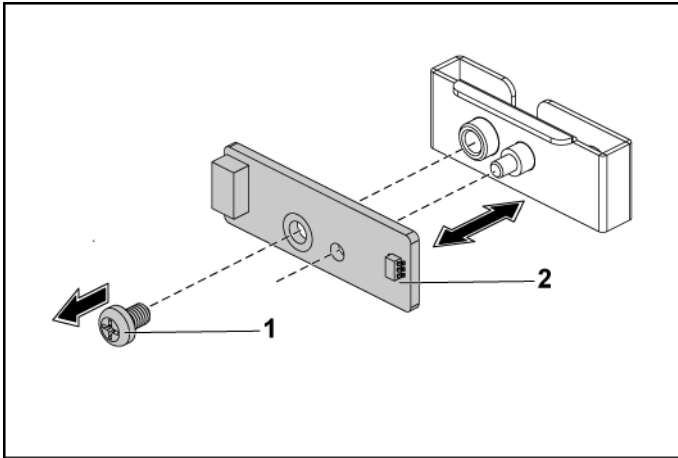
| 1 | screw | 2 | sensor-board holder |

Installing the Sensor Board for 2.5" HDD System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Replace the sensor board into the sensor-board holder. See Figure 3-40.

2 Replace the sensor board assembly into the hard drive cage. See Figure 3-39.

3 Replace the screw that secure the sensor board to the hard drive cage. See Figure 3-39.

4 Connect the sensor board cable to the sensor board. See Figure 5-13.

5   Replace the hard drive cage into the chassis. See Figure 3-30.
6   Replace the screws that secure the hard-drive cage to the chassis. See Figure 3-29.
7   Connect all the cables to the backplane. See Figure 5-6 for 2.5-inch hard drives.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
8   Connect front panel cables to the fan controller board. See Figure 5-11.
    You must route these cables properly through the tabs on the chassis to prevent them from being pinched or crimped.
9   Close the system. See "Closing the System" on page 98.
10 Replace the hard drives. See "Installing a Hard Drive into a Hard-Drive Carrier" on page 64.
11 Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

4

Troubleshooting Your System

Safety First — For You and Your System

⚠ WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

⚠ WARNING: Before removing the system cover, disconnect all power, then unplug the AC power cord, and then disconnect all peripherals, and all LAN lines.

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Installation Problems

Perform the following checks if you are troubleshooting an installation problem:
- Check all cable and power connections (including all rack cable connections).
- Unplug the power cord and wait for one minute. Then reconnect the power cord and try again.
- If the network is reporting an error, verify that the system has enough memory and disk space.
- Remove all added peripherals, one at a time, and try to turn on the system. If after removing a peripheral the system works, it may be a problem with the peripheral or a configuration problem between the peripheral and the system. Contact the peripheral vendor for assistance.
- If the system does not power on, check the LED display. If the power LED is not on, you may not be receiving AC power. Check the AC power cord to make sure that it is securely connected.

Troubleshooting System Startup Failure

If your system halts during startup, especially after installing an operating system or reconfiguring your system's hardware, check for invalid memory configurations. These could cause the system to halt at startup without any video output. See "System Memory" on page 82.

For all other startup issues, note any system messages that appear onscreen. See "Using the System Setup Program" on page 30 for more information.

Troubleshooting External Connections

Ensure that all external cables are securely attached to the external connectors on your system before troubleshooting any external devices. See Figure 1-1, Figure 1-3, and Figure 1-6 for the front- and back-panel connectors on your system.

Troubleshooting the Video Subsystem

1 Check the system and power connections to the monitor.
2 Check the video interface cabling from the system to the monitor.

Troubleshooting a USB Device

Use the following steps to troubleshoot a USB keyboard and/or mouse. For other USB devices, go to step 5.

1 Disconnect the keyboard and mouse cables from the system briefly and reconnect them.
2 Connect the keyboard/mouse to the USB port(s) on the opposite side of the system.
3 If the problem is resolved, restart the system, enter the System Setup program, and check if the nonfunctioning USB ports are enabled.

4 Replace the keyboard/mouse with another working keyboard/mouse.
   If the problem is resolved, replace the faulty keyboard/mouse.
   If the problem is not resolved, proceed to the next step to begin
   troubleshooting the other USB devices attached to the system.
5 Power down all attached USB devices and disconnect them from the
   system.
6 Restart the system and, if your keyboard is functioning, enter the
   system setup program. Verify that all USB ports are enabled. See "USB
   Configuration" on page 44.
   If your keyboard is not functioning, you can also use remote access. If
   the system is not accessible, see "Jumper Settings" on page 158 for
   instructions on setting the NVRAM_CLR jumper inside your system
   and restoring the BIOS to the default settings.
7 Reconnect and power on each USB device one at a time.
8 If a device causes the same problem, power down the device, replace
   the USB cable, and power up the device.
   If the problem persists, replace the device.
   If all troubleshooting fails, see "Getting Help" on page 162.

Troubleshooting a Serial I/O Device

1 Turn off the system and any peripheral devices connected to the serial
   port.
2 Swap the serial interface cable with another working cable, and turn on
   the system and the serial device.
   If the problem is resolved, replace the interface cable.
3 Turn off the system and the serial device, and swap the device with a
   comparable device.

4   Turn on the system and the serial device.

    If the problem is resolved, replace the serial device.

    If the problem persists, see "Getting Help" on page 162.

Troubleshooting a NIC

1   Restart the system and check for any system messages pertaining to the NIC controller.

2   Check the appropriate indicator on the NIC connector. See "NIC Indicators (Management Port)" on page 21.

    • If the link indicator does not light, check all cable connections.
    • If the activity indicator does not light, the network driver files might be damaged or missing.
      Remove and reinstall the drivers if applicable. See the NIC's documentation.
    • Change the auto-negotiation setting, if possible.
    • Use another connector on the switch or hub.

    If you are using a NIC card instead of an integrated NIC, see the documentation for the NIC card.

3   Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.

4   Enter the System Setup program and confirm that the NIC ports are enabled. See "Using the System Setup Program" on page 30.

5   Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed. See the documentation for each network device.

6   Ensure that all network cables are of the proper type and do not exceed the maximum length.

    If all troubleshooting fails, see "Getting Help" on page 162.

Troubleshooting a Wet System

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2   Open the system. See "Opening the System" on page 97.
3   Disassemble components from the system. See "Installing System Components" on page 58.
    - Hard drives
    - SAS backplane
    - Expansion-card
    - Power supplies
    - Fans
    - Processors and heat sinks
    - Memory modules
4   Let the system dry thoroughly for at least 24 hours.
5   Reinstall the components you removed in step 3.
6   Close the system. See "Closing the System" on page 98.
7   Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.
    If the system does not start properly, see "Getting Help" on page 162.
8   If the system starts properly, shut down the system and reinstall the expansion card that you removed. See "Installing the Expansion Card" on page 77.
9   If the system fails to start, see "Getting Help" on page 162.

Troubleshooting a Damaged System

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2 Open the system. See "Opening the System" on page 97.
3 Ensure that the following components are properly installed:
   • Expansion-card assembly
   • Power supplies
   • Fans
   • Processors and heat sinks
   • Memory modules
   • Hard-drive carriers
4 Ensure that all cables are properly connected.
5 Close the system. See "Closing the System" on page 98.
6 If the system fails to start, see "Getting Help" on page 162.

Troubleshooting the System Battery

📝 **NOTE:** If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.

1 Re-enter the time and date through the System Setup program. See "System Setup Options at Boot" on page 31.
2 Turn off the system and disconnect it from the electrical outlet for at least one hour.
3 Reconnect the system to the electrical outlet and turn on the system.

4   Enter the System Setup program.

   If the date and time are not correct in the System Setup program, replace the battery. See "Replacing the System Battery" on page 89.

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

   If the problem is not resolved by replacing the battery, see "Getting Help" on page 162.

✎ **NOTE:** Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the System Setup program, the problem may be caused by software rather than by a defective battery.

Troubleshooting Power Supplies

1   Identify the faulty power supply by the power supply's fault indicator. See "Power and System Board Indicator Codes" on page 21.

⚠ **CAUTION: At least one power supply must be installed for the system to operate. Operating the system with only one power supply installed for extended periods of time can cause the system to overheat.**

2   Reseat the power supply by removing and reinstalling it. See "Power Supplies" on page 65.

   ✎ **NOTE:** After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly. The power indicator turns green to signify that the power supply is functioning properly.

   If the problem persists, replace the faulty power supply.

3   If all troubleshooting fails, see "Getting Help" on page 162.

Troubleshooting System Cooling Problems

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Ensure that none of the following conditions exist:

- System cover, cooling shroud, drive blank, power supply blank, or front or back filler panel is removed.
- Ambient temperature is too high.
- External airflow is obstructed.
- Cables inside the system obstruct airflow.
- An individual cooling fan is removed or has failed. See "Troubleshooting a Fan" on page 139.

Troubleshooting a Fan

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1 Locate the faulty fan indicated by the diagnostic software.
2 Turn off the system and all attached peripherals.
3 Open the system. See "Opening the System" on page 97.
4 Reseat the fan's power cable.
5 Restart the system.
   If the fan functions properly, close the system. See "Closing the System" on page 98.
6 If the fan does not function, turn off the system and install a new fan. See "Cooling Fans" on page 98.

7   Restart the system.
    If the problem is resolved, close the system. See "Closing the System"
    on page 98.
    If the replacement fan does not operate, see "Getting Help" on page
    162.

Troubleshooting System Memory

⚠ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

✎ **NOTE:** Invalid memory configurations can cause your system to halt at startup without video output. See "System Memory" on page 82 and verify that your memory configuration complies with all applicable guidelines.

1   If the system is not operational, turn off the system and attached
    peripherals, and unplug the system from the power source. Wait at
    least
    10 seconds and then reconnect the system to power.
2   Turn on the system and attached peripherals and note the messages on
    the screen.
    Go to step 10 if an error message appears indicating a fault with a
    specific memory module.
3   Enter the System Setup program and check the system memory
    settings.
    See "System Memory" on page 34. Make any changes to the memory
    settings, if needed.
    If the memory settings match the installed memory but a problem is
    still indicated, go to step 10.

4   Turn off the system and attached peripherals, and disconnect the
    system from the electrical outlet.

5   Remove the system-board assembly. See "Removing a System-Board
    Assembly" on page 68.

6   Reseat the memory modules in their sockets. See "Installing the
    Memory Modules" on page 85.

7   Install the system-board assembly. See "Installing a System-Board
    Assembly" on page 69.

8   Reconnect the system to its electrical outlet, and turn on the system
    and attached peripherals.

9   Enter the System Setup program and check the system memory
    settings. See "System Memory" on page 34.
    If the problem is not resolved, proceed with the next step.

10 Turn off the system and attached peripherals, and disconnect the
    system from the power source.

11 Remove the system-board assembly. See "Removing a System-Board
    Assembly" on page 68.

12 If a diagnostic test or error message indicates a specific memory
    module as faulty, swap or replace the module.

13 To troubleshoot an unspecified faulty memory module, replace the
    memory module in the first DIMM socket with a module of the same
    type and capacity. See "Installing the Memory Modules" on page 85.

14 Install the system-board assembly. See "Removing a System-Board
    Assembly" on page 68.

15 Reconnect the system to its electrical outlet, and turn on the system
    and attached peripherals.

16 As the system boots, observe any error message that appears and the
    diagnostic indicators on the front of the system.

17 If the memory problem is still indicated, repeat step 10 through step 16 for each memory module installed.

If the problem persists after all memory modules have been checked, see "Getting Help" on page 162.

Troubleshooting a Hard Drive

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

⚠️ **CAUTION: This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all files on the hard drive.**

1 If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:

   a. Restart the system and enter the host adapter configuration utility program by pressing <Ctrl><H> for LSI 9260 or <Ctrl><C> for a SAS 2008 daughter card.
   See the documentation supplied with the host adapter for information about the configuration utility.

   b. Ensure that the hard drive(s) have been configured correctly for the RAID array.

   c. Take the hard drive offline and reseat the drive. See "Removing a Hard Drive From a Hard-Drive Carrier" on page 63.

   d. Exit the configuration utility and allow the system to boot to the operating system.

2 Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.

3 Restart the system, enter the System Setup program, and verify that the controller is enabled and the drives appear in the System Setup program.
See "Using the System Setup Program" on page 30.
If the problem persists, see "Getting Help" on page 162.

Troubleshooting a Storage Controller

📝 **NOTE:** When troubleshooting a SAS RAID controller, also see the documentation for your operating system and the controller.

1 Enter the System Setup program and ensure that the SAS controller is enabled. See "Using the System Setup Program" on page 30.

2 Restart the system and press the applicable key sequence to enter the configuration utility program.

- <Ctrl><C> for a SAS 2008 daughter card
- <Ctrl><H> for LSI 9260

See the controller's documentation for information about configuration settings.

3 Check the configuration settings, make any necessary corrections, and restart the system.

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

4 Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.

5 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

6   Ensure that the controller card is firmly seated into the system board connector. See "Installing the Expansion Card" on page 77.

7   If you have a battery-cached SAS RAID controller, ensure that the RAID battery is properly connected and, if applicable, the memory module on the RAID card is properly seated.

8   Ensure that the cables are firmly connected to the storage controller and the SAS backplane board.

9   Install the system-board assembly. See "Installing a System-Board Assembly" on page 69.

10 Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.
    If the problem persists, see "Getting Help" on page 162.

Troubleshooting Expansion Cards

NOTE: When troubleshooting an expansion card, see the documentation for your operating system and the expansion card.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1   Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2   Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3   Ensure that each expansion card is firmly seated in its connector. See "Installing the Expansion Card" on page 77.

4   Install the system-board assembly. See "Installing a System-Board Assembly" on page 69.

5 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

6 If the problem is not resolved, see "Getting Help" on page 162.

Troubleshooting Processors

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

3 Ensure that each processor and heat sink are properly installed. See "Installing a Processor" on page 73.

4 Install the system-board assembly. See "Installing a System-Board Assembly" on page 69.

5 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

6 If the problem persists, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

7 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

8 Remove processor 2. See "Removing a Processor" on page 72.

9 Install the system-board assembly. See "Installing a System-Board Assembly" on page 69.

10 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

If the problem persists, the processor is faulty. See "Getting Help" on page 162.

11 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

12 Remove the system-board assembly. See "Removing a System-Board Assembly" on page 68.

13 Replace processor 1 with processor 2. See "Installing a Processor" on page 73.

14 Repeat step 9 through step 11.

If you have tested both the processors and the problem persists, the system board is faulty. See "Getting Help" on page 162.

IRQ Assignment Conflicts

Most PCI devices can share an IRQ with another device, but they cannot use an IRQ simultaneously. To avoid this type of conflict, see the documentation for each PCI device for specific IRQ requirements.

Table 4-1. Assignment Specific IRQ Requirements

IRQ Line	Assignment	IRQ Line	Assignment
IRQ0	8254 timer	IRQ8	RTC
IRQ1	Keyboard controller	IRQ9	SCI
IRQ2	Cascade for IRQ9	IRQ10	USB controller, NIC
IRQ3	Serial port	IRQ11	VGA, USB controller
IRQ4	Serial port	IRQ12	Mouse controller
IRQ5	Free	IRQ13	Processor
IRQ6	Free	IRQ14	Primary IDE controller
IRQ7	USB controller	IRQ15	Secondary IDE controller

5

Jumpers and Connectors

System Board Connectors

This section provides specific information about the system jumpers. It also provides some basic information on jumpers and switches and describes the connectors on the various boards in the system.

Figure 5-1. System Board Connectors
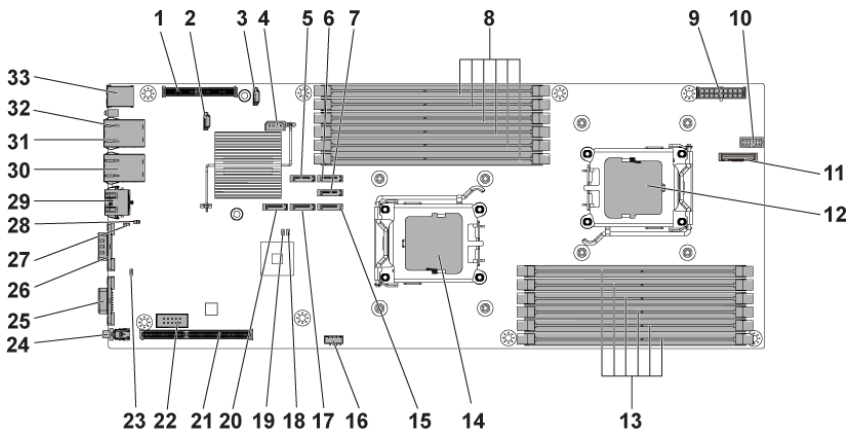
1	PCI-E daughter card connector	2	SGPIO connector 2
3	SGPIO connector 1	4	IPMB connector
5	onboard SATA2 connector 5	6	onboard SATA2 connector 3
7	onboard SATA2 connector 2	8	DIMM sockets for processor 1
9	main power connector	10	front panel connector
11	system battery	12	processor 0
13	DIMM sockets for processor 0	14	Processor 1
15	onboard SATA2 connector 1	16	internal USB connector
17	onboard SATA2 connector 3	18	password jumper

19	BIOS recovery jumper	20	onboard SATA2 connector 6
21	expansion slot	22	internal COM connector
23	BMC disable jumper	24	power button
25	VGA port	26	serial port
27	clear CMOS jumper	28	COM switch
29	management port	30	NIC2 connector (RJ45)
31	NIC1 connector (RJ45)	32	ID LED
33	USB ports		

Backplane Connectors

3.5" drives

Figure 5-2.   Front View of the Backplane
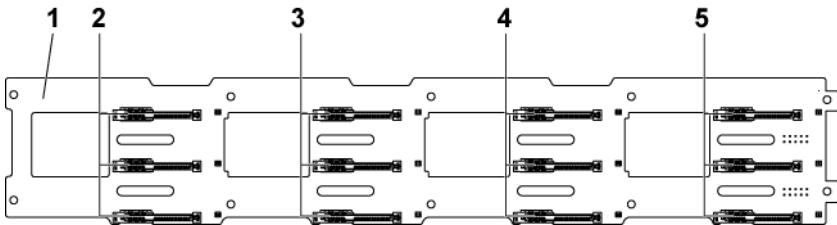
1	3.5" backplane	2	SATA2 and SAS connectors 1,2 and 3 for system board 1 (from top to bottom)
3	SATA2 and SAS connector 1,2 and 3 for system board 2 (from top to bottom)	4	SATA2 and SAS connectors 1,2 and 3 for system board 3 (from top to bottom)
5	SATA2 and SAS connectors 1,2 and 3 for system board 4 (from top to bottom)		

Figure 5-3. Back View of the Backplane
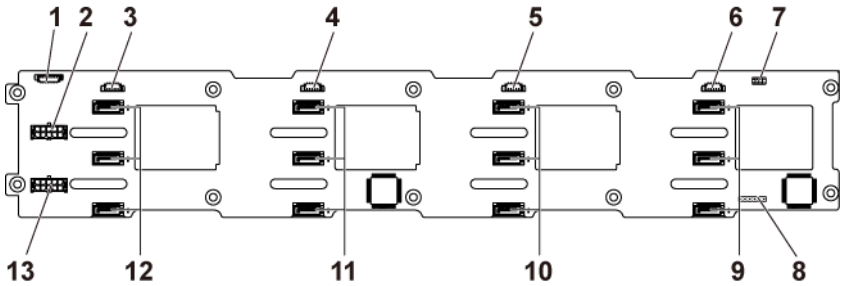
1	fan controller board connector	2	backplane power connector for power supply 1
3	SGPIO connector for system board 4	4	SGPIO connector for system board 3
5	SGPIO connector for system board 2	6	SGPIO connector for system board 1
7	backplane jumper	8	CPLD JTAG connector
9	SATA2 hard drive connectors 1,2, and 3 for system board 1 (from top to bottom)	10	SATA2 hard drive connectors 1,2, and 3 for system board 2 (from top to bottom)
11	SATA2 hard drive connectors 1,2, and 3 for system board 1 (from top to bottom)	12	SATA2 hard drive connectors 1,2, and 3 for system board (from top to bottom)
13	backplane power connector for power supply 2		

2.5" drives

Figure 5-4. Front View of the Backplane
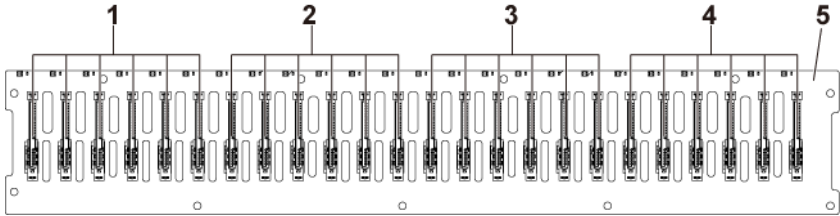
1	SATA2 and SAS connectors 1 to 6 for system board 1 (from left to right)	2	SATA2 and SAS connectors 1 to 6 for system board 2 (from left to right)
3	SATA2 and SAS connectors 1 to 6 for system board 3 (from left to right)	4	SATA2 and SAS connectors 1 to 6 for system board 4 (from left to right)
5	2.5" backplane		

Figure 5-5. Back View of the Backplane-Type 1
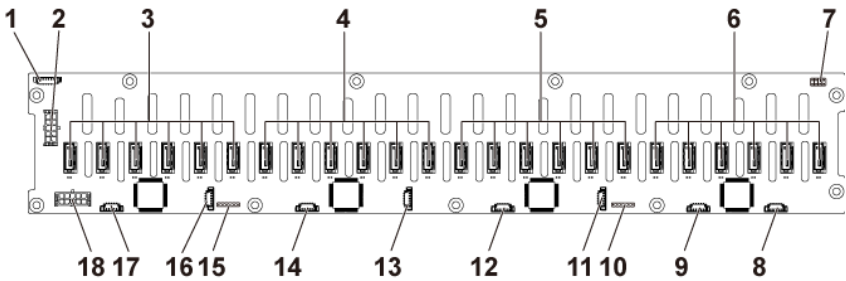
1	system fan board connector	2	backplane power connector for power supply 1
3	SATA2 hard drive connectors 1 to 6 for system board 4 (from right to left)	4	SATA2 hard drive connectors 1 to 6 for system board 3 (from right to left)

5	SATA2 hard drive connectors 1 to 6 for system board 2 (from right to left)	6	SATA2 hard drive connectors 1 to 6 for system board 1 (from right to left)
7	backplane jumper	8	SGPIO connector A for system board 1
9	SGPIO connector B for system board 1	10	CPLD JTAG connector
11	SGPIO connector A for system board 2	12	SGPIO connector B for system board 2
13	SGPIO connector A for system board 3	14	SGPIO connector B for system board 3
15	CPLD JTAG connector	16	SGPIO connector A for system board 4
17	SGPIO Connector B for system board 4	18	backplane power connector for power supply 2

Figure 5-6. Back View of the Backplane-Type 2
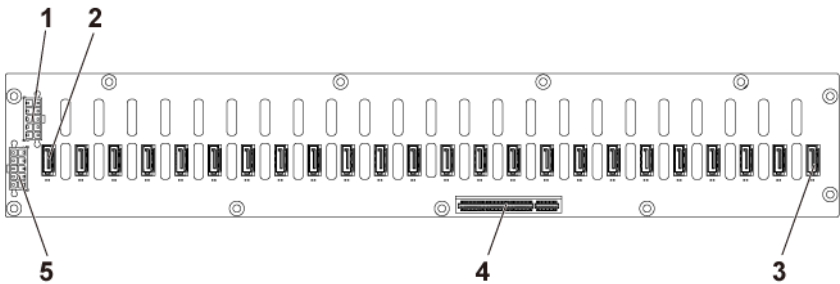
1	power supply connector 2	2	HDD connector number 24-port 24
3	HDD connector number 1-port 1	4	PCIEx8 connector
5	power supply connector 1		

Expander Card Connectors

Figure 5-7. Expander Card Connectors
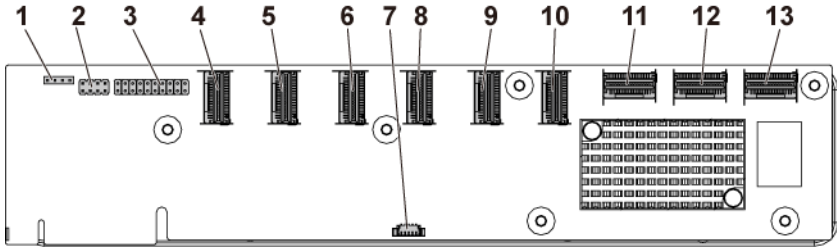
1	UART connector	2	expander card jumper
3	JTAG connector	4	mini-SAS connector 1 (port 1-4)
5	mini-SAS connector 2 (port 5-8)	6	mini-SAS connector 3 (port 9-12)
7	SGPIO connector	8	mini-SAS connector 4 (port 13-16)
9	mini-SAS connector 5 (port 17-20)	10	mini-SAS connector 6 (port 21-24)
11	system board 1 mini-SAS connector	12	system board 2 mini-SAS connector
13	system board 4 mini-SAS connector		

Middle Plane Connectors

Figure 5-8.   Middle Plane Connectors
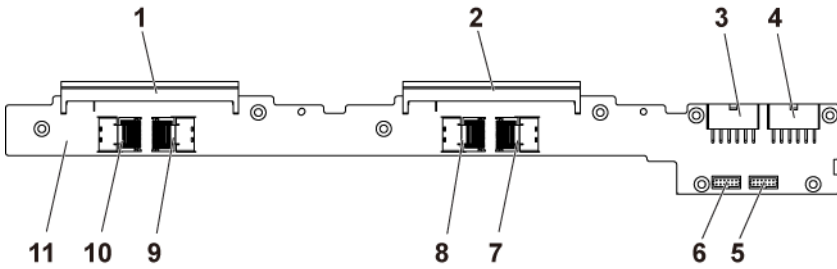
1	middle plane connector 1	2	middle plane connector 2
3	middle plane power connector for system board 1 and 2	4	middle plane power connector for system board 3 and 4
5	front panel connector for system boards 3 and 4	6	front panel connector for system board 1 and 2
7	mini-SAS connector for system boards 3 and 4 (hard drive 1,2,3 and 4)	8	mini-SAS connector for system board 3 and 4 (hard drive 5 and 6)
9	mini-SAS connector for system boards 1 and 2 (hard drive 1,2,3 and 4)	10	mini-SAS connector for system boards 1 and 2 (hard drive 5 and 6)
11	middle plane		

Interposer Extender Connectors

Figure 5-9.   Interposer Extender Connectors
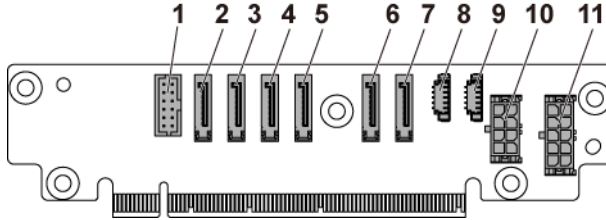
1	front panel connector	2	onboard SATA2 connector 1
3	onboard SATA2 connector 2	4	onboard SATA2 connector 3
5	onboard SATA2 connector 4	6	onboard SATA2 connector 5
7	onboard SATA2 connector 6	8	SGPIO connector A
9	SGPIO connector B	10	2x4pin power connector
11	2x5pin power connector		

Daughter Card Connectors

Figure 5-10. Daughter Card Connectors
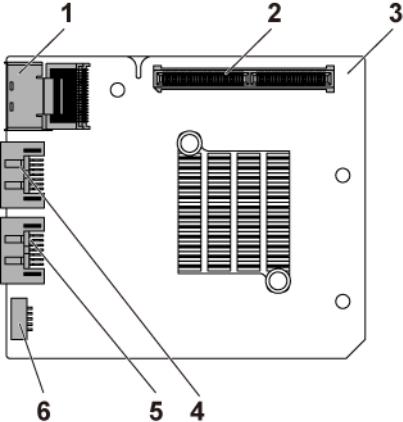
1	mini-SAS connector	2	daughter card connector
3	daughter card	4	SAS port 4
5	SAS port 5	6	SGPIO connector B

Fan Controller Board Connectors

Figure 5-11. Fan Controller Board Connectors
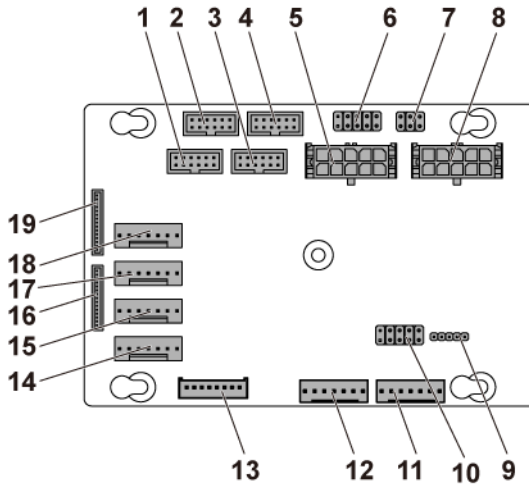
1	front panel connector for system board 4	2	front panel connector for system board 2
3	front panel connector for system board 1	4	front panel connector for system board 3
5	system fan board power connector 1	6	PIC firmware recovery and PS-ON connector
7	system fan speed control jumper	8	system fan board power connector 2
9	PIC firmware update connector	10	product ID select and power throttling disable jumper
11	system fan board connector 2	12	system fan board connector 1
13	hard drive backplane connector	14	system fan connector 4
15	system fan connector 3	16	front panel connector 2
17	system fan connector 2	18	system fan connector 1
19	front panel connector 1		

Power Distribution Board Connectors

Figure 5-12. Power Distribution Board Connectors
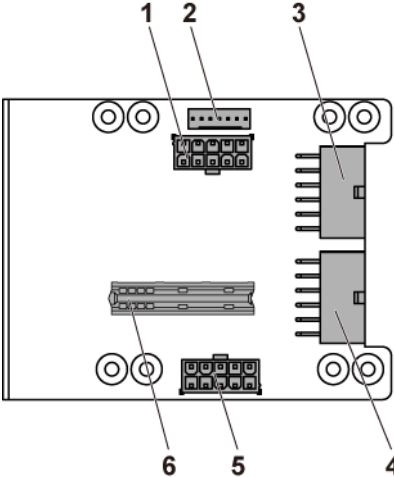
1	backplane power connector	2	system fan board connector
3	main power connector for system board 3 and 4	4	main power connector for system board 1 and 2
5	system fan board power connector	6	bridge card connector

Sensor Board Connectors

Figure 5-13. Sensor Board Connectors
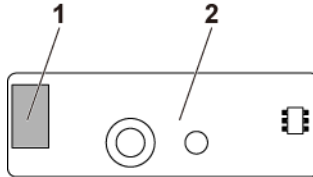
1	power connector	2	sensor board

Jumper Settings

⚠️ **CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

System Configuration Jumper Settings

The function of system configuration jumper installed on each system board is shown below:

Figure 5-14. System Configuration Jumpers
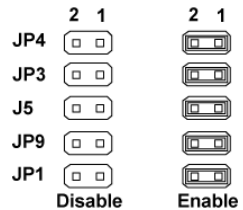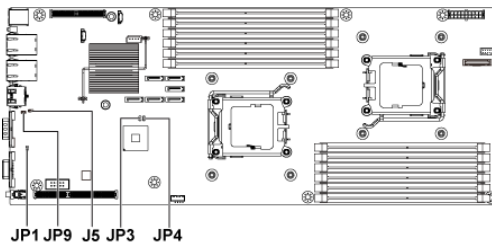
Table 5-1. System Configuration Jumper

Jumper	Function	Off	On
JP4	Clear Password	*Disable	Enable
JP3	BIOS Recovery	*Disable	Enable
J5	COM Port Switch**	*Disable	Enable
JP9	Clear CMOS	*Disable	Enable
JP1	BMC Configuration	*Disable	Enable

NOTE: The * in the table of system configuration jumper describes the default status and the default state is not active state.

NOTE: ** means if disabled, BMC Port 1 is set to internal and port 2 to external; if enabled, BMC Port 1 is set to external, and internal port has no function.

Backplane Jumper Settings

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The function of jumpers installed on 3.5" backplane and 2.5" backplane is the same. Following is an example using the jumpers installed on 3.5" backplane.

Figure 5-15. Jumper Installed on Backplane
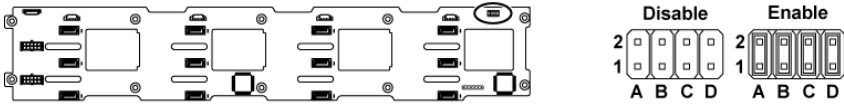
Table 5-2. Jumpers Installed on Backplane

Jumper	Function	Off	On
A	HDD Type Select	*Disable	Enable
B	SAS Code Select	*Disable	Enable
C	MFG Test	*Disable	Enable
D	LED Control	*Disable	Enable

NOTE: The * in the table of backplane jumper describes the default status and the default state is not active state. When connecting the 1CH SAS daughter card, insert the jumper cover onto the hard drive type select jumper. For onboard SATA2 connectors, do not insert the jumper cover onto the hard drive type select jumper.

Backplane Expander Card Jumper Settings

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

The function of backplane jumper installed on the expander card is shown below:

Figure 5-16. Jumper Installed on Expander Card
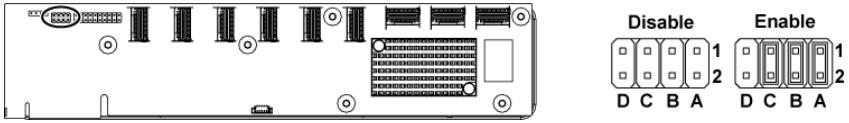
Table 5-3. Jumpers Installed on Expander Card

Jumper	Function	Off	On
A	SAS Card Selection	*Disable	Enable
B	MLB Mode Selection	*Disable	Enable
C	UART Selection	*Disable	Enable
D	Reserved	—	—

✐ **NOTE:** The * in the table of system configuration jumper describes the default status and the default state is not active state.

6

Getting Help

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1   Visit **support.dell.com**. Click your country/region at the bottom of the page. For a full listing of country/region, click **All**. Click **All Support** from **Support** menu.

2   Select the appropriate service or support link based on your need.

3   Choose the method of contacting Dell that is convenient for you.

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